Date Due

ANNUAL REPORT

OF THE

AMERICAN INSTITUTE,

OF THE

CITY OF NEW YORK,

FOR THE YEARS

1862, '63.

ALBANY:
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1863.

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AMERICAN INSTITUTE.

Trustees and Committees.

1862.

President.—WILLIAM HALL.

Vice-Presidents.—John Gray, Dudley S. Gregory, William Hibbard.

Recording Secretary.—Thomas McElrath.

Corresponding Secretary.—James Renwick.

Treasurer.—Benedict Lewis, Jr.

Finance Committee.—Thomas M. Adriance, John M. Reed, William S. Slocum, Jacob C Parsons, Jonathan H. Ransom.

Managers of the Fair.—James C. Baldwin, Wm. H. Butler, Wm. Ebbitt, Thomas F. De Voe, John V. Brower, George Timpson, Thos. Williams, Jr., Andrew Bridgeman, John B. Peck, F. W. Geissenhainer, John Johnson, Wm. S. Carpenter, T. B. Stillman, George Peyton, James Knight, Wm. Cotheal, Henry Steele, Geo. M. Woodward, Geo. R. Jackson, James R. Smith, Clarkson Crolius, Geo. C. Mann, John G. Bergen, D. R. Jaques.

Committee on the Library—Wm. Hibbard, Edward Walker, Jireh Bull, James K. Campbell, Russell Smith.

Committee on Agriculture.—Jas. J. Mapes, Wm. Lawton, Adrian Bergen, W. S. Carpenter, Edward Doughty.

Committee on Manufactures, Science and Art.—James Renwick, John D. Ward, S. D. Tillman, Joseph Dixon, Jas. L. Jackson.

Committee on Commerce.—Rush Patterson, Joseph Hoxie, Luther B. Wyman, E. D. Plimpton, John R. Montgomery.

Committee on the Admission of Members.—Robert Lovett, John W. Chambers, George G. Taylor, Wm. A. Leffingwell, Joseph Lamb.

Committee on Correspondence.—John H. White, Hiram Dixon, Henry L. Stuart, John W. Avery, George F. Barnard.

Committee on Repository.—Martin E. Thompson, James Bogardus, Wm. Close, John B. Rich, T. D. Stetson.

Clerk and Librarian.—John W. Chambers.

Messenger.—William Christie Miller.

1863.

President.—WILLIAM HALL.

Vice-Presidents.—Dudley S. Gregory, Edward Walker, Sylvester R. Comstock.

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Committee on the Library.—William Hibbard, Jireh Bull, James K. Campbell, Russell Smith, Jacob L. Baldwin.

Committee on Agriculture.—James J. Mapes, William Lawton, Adrian Bergen, W. S. Carpenter, Edward Doughty.

Committee on Manufactures, Science and Art.—Charles A. Joy, John D. Ward, Samuel D. Tillman, Joseph Dixon, James L. Jackson.

Committee on Commerce.—Rush Patterson, Luther B. Wyman, Hiram Dixon, Spencer Kirby, John P. Veeder.

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Messenger.—Wm. Christie Miller.

State of New York.

No. 233.

IN ASSEMBLY,

March 27, 1863.

TRANSACTIONS OF THE AMERICAN INSTITUTE.

AMERICAN INSTITUTE,
NEW YORK, *March* 27, 1863.

To the Hon. T. C. CALLICOT,

Speaker of the Assembly of the State of New York, Albany:

Sir—I have the honor to transmit herewith the Annual Report of the American Institute of the City of New York, for the years 1862–63.

I have the honor to be,
With much respect,
Your obedient servant,
JOHN W. CHAMBERS,
Acting Corresponding Secretary.

REPORT OF THE TRUSTEES

OF THE AMERICAN INSTITUTE OF THE CITY OF NEW YORK

To the Honorable Legislature of the State of New York:

The Trustees of the American Institute, in conformity with law, beg leave to present their Annual Report for the years 1862–3.

No public exhibition or fair was held during the past year, but, nevertheless, the Institute has been true to its mission; and the report of the Board of Managers, and the Proceedings of the Farmers' Club and Polytechnic Association, will show to what extent and in what manner it has afforded encouragement and given aid to the industrious pursuits, which have heretofore received its favors and its benefits.

In the month of May last, the Trustees presented to the common council of the city of New York the following memorial:

To the Honorable the Common Council of the City of New York:

The undersigned, Trustees of the American Institute of the city of New York, respectfully represent to your honorable body:

That the promotion of agriculture, commerce and the mechanic and manufacturing arts, are the objects contemplated by the charter of the Institute; and that for a period of upwards of thirty years the steady aim of its members and managers has been devoted to the advancement of these interests; that the exhibitions and fairs of the Institute have contributed largely to the prosperity of the city of New York, by attracting to it many thousands of strangers annually, and by concentrating at this point the earliest improvements and the best inventive genius of the nation.

Your memorialists would further represent that, since the conversion of Castle Garden to its present use, and the destruction of the crystal palace by fire, there are no buildings or inclosures of sufficient magnitude in the city of New York to answer for such exhibitions as are now demanded by the public, and such as the Institute desires to present.

Relying, therefore, upon the co-operation of your honorable body to aid their endeavors to meet the demands of the country in this regard, they pray your honorable body to grant them a lease of Reservoir Square, at a nominal rent, under such restrictions and limitations as to your honorable body may seem just and proper.

This petition is accompanied by a plan of the character of the building to be erected by the Institute.

And your petitioners will ever pray.

This memorial was referred to a special committee, which committee have not yet reported.

Should the action of the common council be adverse to the prayer of the petitioners, this board would respectfully suggest to their successors, the new Board of Trustees, that application be made for the privilege of erecting a suitable building for the Institute, on the grounds of the Battery, and that a sufficient space, say three hundred feet square, be allotted for that purpose.

The Trustees deem it of the utmost importance to the prosperity of the Institute that the annual fairs should be continued, provided such accommodations for an exhibition can be procured in an eligible position as will afford the necessary space. They deem any effort to get up a fair, which shall not be complete and comprehensive, as impolitic and unwise; they, therefore, heartily approve of the course of the Board of Managers, for the last two years, in resisting all attempts to present an exhibition, which, for the want of proper accommodations, could only have resulted in loss to the Institute, and in disappointment to the public.

The Trustees, during the past year, appeared before the commissioners of taxes and succeeded in procuring a reduction of $260.60 in the tax levy of the past year.

The report of the Finance Committee exhibits the financial condition of the Institute, while that of the Library Committee gives encouraging information of the continued usefulness of this branch of our Institute.

The property of the Institute, No. 351 Broadway and No. 89½ Leonard street, has been leased for two years, from May last, at an annual rent of $5,500.

The Trustees cannot close their report without alluding to the loss of one of the members of their own Board. The announcement of the death of Prof. James Renwick, Corresponding Secretary of the Institute, and by virtue of this office one of its Trustees, has already been officially communicated to the Institute. He performed his last literary labors at his desk in this building. He was the earnest and active friend of science, and his extensive information, especially on all matters pertaining to chemistry and natural philosophy, rendered him among the most respected of the members of the Institute, and one of its most esteemed and useful officers.

All of which is respectfully submitted.

New York, *March* 24, 1863.

WM. HALL,
D. S. GREGORY,
EDWARD WALKER,
S. R. COMSTOCK,
BENEDICT LEWIS, Jr.,
THOMAS McELRATH,
Trustees.

PROCEEDINGS OF THE INSTITUTE.

REPORT OF THE COMMITTEE ON AGRICULTURE OF THE AMERICAN INSTITUTE.

The Committee on Agriculture of the American Institute, in pursuance of the 49th section of the by-laws, beg leave respectfully to report:

Your committee entered upon their labors on the 13th day of February, 1862, and, in accordance with the duties prescribed for them, have actively carried out the purposes of the Institute intrusted to their care.

That most useful adjunct of the Institute, the Farmers' Club, has held 36 meetings, the attendance at which has been generally large. Many philanthropic members of the Institute, in addition to the members of your committee, have attended the meetings of the Club, and have lent their aid in rendering the transactions instructive and interesting. Among those in attendance are some of the most able agriculturists and horticulturists of the day; and the discussions have been so conducted as to enable those in attendance to become acquainted in a single hour with the best current information on the subject under consideration. The reading and experience of all present have been rendered available to each, and we do not doubt that after the discussion of many of these subjects, that every person present knew more of its merits than any one at the commencement of the meeting. Letters are received at every meeting asking the advice of the Club on various questions, and the replies are generally pertinent to the questions. These letters are usually read during the hour devoted to miscellaneous business, and thus the hour devoted to the regular question of the day is rendered doubly valuable by being so appropriated.

Among the subjects which have been fairly discussed at these meetings are the following:

1. Butter and butter making.
2. Culture of the Strawberry.
3. Culture of Grapes.
4. do Currants and other small fruits.
5. do Peaches.

6. Culture of Pears.
7. do Apples.
8. do Asparagus.
9. do Sorghum.
10. Preservation and ripening of fruits.
11. Detention houses and fruit rooms.
12. Country houses and their surroundings.
13. California wines.
14. Bee keeping.
15. Drain tiles and draining.
16. Management of manures.
17. Preparation of food for cattle, including the cutting and chaffing of hay, pulping of roots, steaming of food, &c.
18. Culture, preservation and feeding of root crops.
19. Proper fall treatment of clayey soils.
20. Proper fall treatment of sandy soils.
21. Culture and care of flowers.
22. Labor-saving implements.
23. Mushrooms and their culture.
24. Truffles, their use, amount imported, &c., &c.
25. New methods of tilling the soil.

Many of these meetings have been reported by the Clerk, Mr. Chambers, and will be found in the Transactions of the Institute, and therefore need no repetition here.

In relation to No. 2 (culture of strawberries), your committee feel pleasue in saying that although it occupied an hour each day for three or more meetings, yet the interest was well sustained, and in no book extant is there as much information given on this subject as was there offered on strawberries.

No. 3. Grapes included all the known methods of culture, including pruning, &c., &c., with practical and didactic operations on vines furnished by the members. Specimens of grapes of all the best known kinds were exhibited and distributed among those in attendance.

No. 6. Pears and their culture have been more fully discussed in our Club than elsewhere, so far as is known to your committee. Specimens were freely sent for distribution, both of pears and all other fruits; and when items Nos. 10 and 11 were discussed, the display of fruit was highly creditable.

No 9. Sorghum. The making of sugar from the sorghum and imphee was a most interesting subject, rendered doubly important by the increased manufacture of the West during the last two years. This new industry promises to render the United States quite independent of foreign growers in the production of sugar,

which can no longer be viewed as merely an article of luxury, but rather one of necessity. It has been clearly proved that the juice of the sorghum, when properly grown, is as strong as the juice of the cane in Louisiana; and Mr. J. Lovering, of Philadelphia, and others, have produced white sugar direct from the juice equal in quality to the refined sugar now in general use.

No. 13. California wines. Numerous specimens were shown at the Club, and the special report of the meeting may be read with interest. The quality of these wines was far better than that of any wines before made in our country, while the extent of their manufacture promises to equal that of any well known wine districts of Europe. The sparkling wine shown resembled the celebrated sparkling Clos de Vouguet, while the clarets resembled the Chateau wines of France. One sample was of the general character of Madeira wine, another of Sherry wine; all the above of fine quality. The Tinto wine, offered as resembling the wine of Oporto, was the only failure, as this was quite inferior to the result from the Portugal grape grown in Madeira, and known as Tinto Madeira. Late accounts from California state that one grower made last year 200,000 gallons, another 140,000 gallons, while the smaller operators were very numerous.

No. 15. Drain tiles and draining. This subject has occupied much of the time of the Club, and particularly in connection with sub-soil plowing. It is now very generally admitted that underdrained and sub-soiled lands never suffer from drought, while grass lands so prepared may be kept in grass, yielding full crops of hay for a long term of years, without being taken out of grass; such fields, with judicious and not expensive top dressings, may be kept at their highest rate of yield *indefinitely*. And when we remember that the hay crop of the middle, northern and western States has a larger value than the cotton crop, and that the foreign demand for our hay is steadily on the increase, too much importance cannot be given to a system which, wherever fairly tried, materially increases the amount of this and other crops, at the same time deepening the available soil permanently and efficiently.

No. 16. Management of manures is also a most important subject. This has been fully reported, and will add interest to our annals.

No. 17. Preparation of food for cattle has been fairly treated, and your committee have taken great pains to place all reliable information on this subject before the Club. During the remaining portion of the term of service of your committee, they intend to bring the various details of this subject separately before the meetings, with a view of exciting members to settle all vexed questions connected therewith by experiment.

No. 21. The culture and care of flowers has caused full attendance of ladies at the meetings.

No. 22. Labor-saving machinery and implements have not been neglected; for, in addition to the discussions on this subject, many new implements have been exhibited and explained before the Club.

Three of these have been placed under the charge of special committees, who have practically tested their value, and their reports now form part of the record of the Institute.

The new seedling strawberries of Mr. Fuller have been closely watched by the Club, committees frequently visiting his grounds, and their reports have fully satisfied the members that we shall have a few new varieties of improved qualities.

Many new varieties of potatoes have been presented to this Club, and some of these are now in the hands of members for testing, and will doubtless form an interesting portion of future reports.

The Board of Managers having offered 25 premiums for machines and essays, and referring them to the Farmers' Club for their decision, the time for receiving applications for the same not having expired, they cannot report on them before the meeting in February.

Your committee are fully impressed with the belief that the general usefulness of the Farmers' Club fully warrants a more extended advertisement of its meetings, so as to cause a more numerous attendance, and in pursuance thereof would ask an appropriation of $ to be placed at their disposal for that purpose. They would further suggest that the transactions at their meetings should be more widely published, the New York Tribune being now the only paper in which they appear, and the space there devoted entirely inadequate to full reports. For the manner of inducing such reports they would ask the advice and co-operation of the Institute, at least in the exercise of the personal influence of its members.

The quality of the reports of the meetings of the Farmers' Club has been materially improved since they have been prepared for the Transactions by Mr. John W. Chambers, and subject to the surveillance of the Corresponding Secretary of the Institute.

All of which is respectfully submitted.

JAMES J. MAPES,
ADRIAN BERGEN,
EDWARD DOUGHTY,
WM. S. CARPENTER,
Committee.

REPORT

OF THE COMMITTEE ON MANUFACTURES, SCIENCE AND ART OF THE AMERICAN INSTITUTE.

The Committee on Manufactures, Science and Art, in compliance with a resolution of the Institute, respectfully report:

That at their first meeting, on the second Wednesday in March last, they were organized by the selection of Prof. Renwick as chairman, and Samuel T. Tillman as secretary for the year; at the same meeting Prof. Chas. A. Joy, of Columbia College, was appointed chairman of the Polytechnic Association, and Thos. D. Stetson its secretary.

During the summer Prof. Charles A. Joy visited Europe, and since his return his college duties have increased so as to prevent his attendance. In tendering his resignation, he expressed great interest in the welfare of this branch of the American Institute.

The association having been several months without a regular chairman, the committee thought it their duty to accept the resignation of Prof. Joy. At the November meeting, Samuel D. Tillman was selected as chairman of the Polytechnic for the remainder of the year.

The proceedings of the association have not been as fully reported as when a reporter was specially employed for that purpose; but the able abstracts from the discussions, which have regularly appeared in the Scientific American, show that the association have devoted much attention to all mechanical and chemical improvements directly connected with the great military movements now going on, while they have not overlooked the progress of the useful arts in other directions.

During the present year your committee have not been directed by the Institute to examine any invention or improvement; they have had, however, before them several novelties, upon which they will make reports whenever authorized to do so. The committee cannot close without alluding to the devotion which their chairman has uniformly shown in the welfare of the Institute. Previous to his present illness, his frequent attendance at their rooms was a sure guaranty that the interests of such manufacturers and artisans as might require the action of this committee, would not be overlooked.

Respectfully submitted.

JOHN D. WARD,
JOSEPH DIXON,
JAS. L. JACKSON,
S. D. TILLMAN,
Committee.

NEW YORK, *December* 2, 1862.

Report of the Committee on J. Wyatt Reid's Plans and Models, illustrating his Mode of Constructing Forts and Stationary Defences.

The plans and models exhibited to your committee by Mr. J. Wyatt Reid, illustrate his mode of constructing forts and stationary defences, which consists essentially in the substitution of cast iron blocks for stone and brick. The model blocks of wood shown to your committee are about the size intended to be used. They are cubes of nearly two feet, and, if made of iron, would weigh about one ton each. The blocks have corresponding elevations and depressions of their surfaces, so that the elevations of one block will fit into the depressions of another. When laid in place they overlap each other, so that one block has a bearing on several others. It is intended to make the surfaces compact by the use of bitumen.

Walls constructed on the plan of Mr. Reid would be vastly stronger than those of brick or stone, but the brittleness of cast iron is such, that repeated blows would chip off the corners and edges of these blocks; where this action would be arrested must be decided by experiment.

A correct estimate of the power of resistance in these blocks, can only be made by repeated trials on an extended scale.

Your committee cannot, therefore, form an opinion as to the value of the alleged improvement, but they would not hesitate to recommend that targets be constructed of blocks as proposed by Mr. Reid, and tested by the General Government.

Respectfully submitted. JOHN D. WARD,
JOSEPH DIXON,
SAM'L D. TILLMAN,
JAMES L. JACKSON,
New York, *January* 7, 1863. *Committee.*

Report of the Committee on Warren Rowell's Improvement on the Reciprocating Piston Steam Engine.

The mechanical arrangement shown to your committee by Mr. Warren Rowell, is claimed to be an improvement in the reciprocating piston steam engine. Mr. Rowell assumes that there is a loss of power in the application of steam to the piston during the first quarter of the stroke. To obviate this, he has constructed a cylinder with double heads; the inner two are movable, and each is so arranged as to move with the piston through about one-quarter of the stroke, when it stops, and the steam then enters between it and the piston, by which means the steam required to fill that portion of

the cylinder traversed by the movable head is saved. The movable heads are connected by parallel rods on the outside of the cylinder, and are held at their stationary points by a ratchet arrangement. The object of the inventor is to apply the steam to the piston only during the half of the stroke when it has the quickest motion; it is evident that this arrangement would require the momentum of a heavy fly-wheel to carry the crank through a portion of its path, even when the engine was doing no work; to remedy this defect, the inventor proposes to use two cylinders of the kind described, having their cranks at right angles. The movable heads being packed, and having connecting rods passing through stuffing boxes, may be regarded as pistons in estimating the friction of this engine. Admitting that the machine can be made to work practically, a plain statement of the proposed improvement is, *the substitution of two cylinders and six pistons for one cylinder and one piston.*

The crank is admirably adapted to the reciprocating piston, the dead points being precisely where the piston must change its direction, and the leverage of the crank increasing and decreasing directly as the velocity of the piston, there is no loss of steam; consequently no loss of power except in friction. That the sum of friction is less in the Rowell's complicated arrangement is not demonstrated. Your committee, therefore, while admitting its ingenuity, cannot commend it as a useful improvement.

Respectfully submitted.

JOHN D. WARD,
JOSEPH DIXON,
SAM'L D. TILLMAN,
JAS. L. JACKSON,
Committee.

NEW YORK, *January* 7, 1863.

FINANCES.

The following is the financial condition of the American Institute on the first day of February, 1863:

Balance in the treasury Feb. 1, 1862		$84 26
The Receipts of the year have been—		
From rent of premises No. 351 Broadway and No. 89½ Leonard street	$7,111 00	
Admission fees and dues, viz: initiation fees, $45; annual dues, $497; life membership, $40	582 00	
Duplicate medals	41 00	
Certificate of award	2 00	
Sales of duplicate volumes, &c.	10 86	
" Transactions	4 00	
" packing cases	9 50	
		7,760 36
		$7,844 62

Expenditures.

Real Estate.			
Interest on bond and mortgage, $20,000, at 6 per cent.	$1,200 00		
Taxes, 1862, on real estate	1,153 37		
Assessment	574 60		
Repairs	25 85		
		$2,953 82	
Library.			
Books	$53 39		
Periodicals	71 56		
Binding	125 13		
Newspapers	28 18		
		278 26	
On account of 30th Annual Fair.			
Oil casks		8 76	
On account of 31st Annual Fair.			
Pulleys, collars, &c.		39 30	
On account of 33d Annual Fair.			
Printing		10 88	
Carried forward		$3,291 02	$7,844 62

Brought forward		$3,291 02	$7,844 62
Miscellaneous.			
Rent of rooms in Cooper Union Building	$1,375 00		
Storage of property used at the Fairs	40 00		
Insurance on real estate	101 71		
" library	32 40		
" other property	5 25		
Printing	48 00		
Stationery	12 91		
Advertising	45 00		
Gas	67 00		
Reporting meetings of the Polytechnic Association and Farmers' Club	195 00		
Freight on Transactions	7 88		
Incidental expenses	178 99		
		2,109 14	
Salaries.			
Corresponding Secretary	$350 00		
Clerk	1,500 00		
Messenger	295 00		
		2,145 00	
			7,545 16
Balance in the treasury Feb. 1, 1863			$299 46

THOMAS M. ADRIANCE,
JOHN M. REED,
WM. S. SLOCUM,
JACOB C. PARSONS,
JONATHAN H. RANSOM,
Financial Committee.

Account of property held by the Institute February 1, 1863.

Real estate—No. 351 Broadway and No. 89½ Leonard street, cost	$45,800 00	
Less mortgage	20,000 00	
		$25,800 00
Library and fixtures		13,643 65
Office furniture and fixtures, iron safes, case of models of fruit, &c.		934 75
Carried forward		$40,378 40

Brought forward	$40,378 40
Property used at the Fairs	1,353 60
Gold and silver medals on hand	339 04
	$42,071 04
Cash in the treasury Feb. 1, 1863	299 46
Total	$42,370 50

REPORT

OF THE LIBRARY COMMITTEE OF THE AMERICAN INSTITUTE, 1863.

The report submitted by the Library Committee to the Institute, at its stated meeting in the month of December, was merely a brief statement of its operations up to that period. Your committee now beg leave to submit their Annual Report, as directed by section 49 of the by-laws.

The present and past year have been rendered memorable in the annals of our history, and but little encouragement has been offered to make any unusual efforts to extend the usefulness of this branch of the Institute, either to its members or to the public. Yet, while surrounded with discouraging influences, your committee have not desponded in their labors, although they have not been disposed to make the usual annual additions of books to the library. They have consequently restricted their purchases to such books as seemed absolutely necessary to supply the wants of those members whose pursuits are more particularly of a scientific character.

Their monthly meetings have been held regularly, at all of which a quorum of members have been present; and many of them have been attended by the whole committee.

The number of volumes in the library, at the date of the last report was		8,332
There has been added during the year by purchase	36	
By subscription	23	
exchanges	34	
donations	62	
	—	155
Total volumes in the library		8,477

It may not be uninteresting to the Institute to know that your committee are somewhat extensively connected by correspondence and exchanges with kindred institutions, both in our own and other countries; they, therefore, deem it not inappropriate to specify them. They comprise the following:

Austria.—Engineers' Society, Vienna.

Garden Culture Society, Vienna.

Imperial Royal Agricultural Society, Vienna.
Trades' Society, Vienna.
Batavia.—Batavian Society of Arts and Sciences.
France.—Academy of Science, Paris.
Agricultural Society of France, Paris.
Horticultural Society of France, Paris.
Imperial Society d'Acclimation, Paris.
Imperial Society of Emulation d'Abbeville.
Library of the city of Paris.
do do Nantes.
do do Marseilles.
do do Rouen.
do do Bordeaux.
do do Mentz.
do do Lyons.
Minister of Agriculture and Commerce, Paris.
Museum of Natural History of France.
National Assembly, France.
National Academy of Rouen.
Society for the Encouragement of National Industry.
Great Britain.—Royal Agricultural Society of England.
Society of Arts, London.
Highland Agricultural Society of Scotland.
Canada.—Mechanics' Institute, Montreal.
Natural History Society, Montreal.
Library, city of Montreal.
Mechanics' Institute, Toronto.
Russia.—Imperial Library, St. Petersburg.
Imperial Academy, St. Petersburg.
Imperial Free Economic Society of St. Petersburg.
Horticultural Society of St. Petersburg.
Imperial Society of Agriculture, Moscow.
United States.—Agricultural College, Michigan.
American Antiquarian Society, Worcester, Mass.
Burlington County, N. J., Society of History and Natural Sciences.
Brooklyn Horticultural Society.
Franklin Institute of Pennsylvania, Philadelphia.
Harvard College Library.
Illinois State Agricultural Society.
Maine Board of Agriculture.
Massachusetts Board of Agriculture.
Michigan State Agricultural Society.
Maryland Institute, Baltimore.
Maryland Historical Society, Baltimore.

Mercantile Library Association, New York.
Nantucket Atheneum.
Naval Lyceum, Brooklyn.
New Jersey State Agricultural Society.
New Hampshire Agricultural Society.
New Hampshire Historical Society.
New Orleans Academy of Sciences.
Ohio State Agricultural Society.
Patent Office, Washington, D. C.
Pennsylvania Agricultural Society.
Philadelphia Society for Promoting Agriculture.
Providence Atheneum.
Pottsville Library, Pottsville, Pa.
Rhode Island Historical Society.
Rhode Island Society for the Encouragement of Domestic Industry.
Smithsonian Institution, Washington, D. C.
State Library, Providence, R. I.
Union College, Schenectady, N. Y.
Vermont Historical Society.
Waterbury Young Men's Institute, Connecticut.
Wisconsin State Agricultural Society.
Wisconsin State Historical Society.
Wisconsin University Library.
Yale College, New Haven, Conn.
Young Men's Mercantile Library, Cincinnati, Ohio.

Owing to the temporarily diminished resources of the Institute, your committee deem it inexpedient to ask a further appropriation of money for their use at present. There remains subject to their draft, of an unexpended appropriation, the sum of $83.06, with which it is hoped their successors will be able to meet all obligations that may be incurred by them during the next year. It cannot be denied that the library rooms present one of the most attractive features of the Institute; they are well warmed and lighted, and offer inducements to its members to frequent them often. The most instructive and interesting periodicals are at their command, while those who are more particularly interested in agriculture and science, will always find standard works upon those subjects to aid them in their researches. Nor should it be forgotten that the Institute offers attractions to those who are not specially devoted to these interesting and important objects. It is centrally located, easy of access, the annual dues are small, and if no higher motive than that of economy were urged, it is doubtful if any public institution in the city offers superior inducements, or where one can pass an evening more satisfactorily or profitably, especially when it is considered that every member is

entitled to participate in the very interesting weekly debates of the Polytechnic Association and the Farmers' Club. The objects of the Institute being to disseminate useful information, rather than to promote its own aggrandizement, its operations are not confined to the circumscribed limits of its own members; and it is to be regretted that a co-ordinate committee of the Institute has recommended so great a retrenchment in its expenses as to preclude the advantages herein set forth. However, the visits of strangers are cordially invited; they will always receive the polite attention of the competent Librarian, who will at all times impart such information as is calculated to make their visits pleasant and instructive.

Believing that the winter of our discontent will soon be made glorious summer by the revival of those employments which tend to peace and prosperity, which are elevating and ennobling, onward and upward, diffusing light and knowledge in all their course, and never ceasing until the Institute shall have accomplished the great objects for which it was chartered.

All of which is respectfully submitted.

WM. HIBBARD,
JAMES K. CAMPBELL,
JIREH BULL,
EDWARD WALKER,
RUSSELL SMITH,
Committee.

OBITUARY.

DEATH OF PROFESSOR JAMES RENWICK, LL.D., CORRESPONDING SECRETARY OF THE AMERICAN INSTITUTE.

A special meeting of the American Institute was held on Friday, January 16, 1863, at its rooms in the Cooper Union Building, at $2\frac{1}{2}$ o'clock, P. M., the president of the Institute (Wm. Hall) in the chair.

Mr. Jireh Bull.—I rise to perform a melancholy duty; the graves of Bunting, Reese and Meigs are fresh in our memories; we are now called to add another to the list of those who have been identified with the toils, the prosperity and the success of this Institute.

James Renwick, our corresponding secretary, died at his residence, No. 21 Fifth avenue, in this city, surrounded by his family, on Monday evening, January 12, aged seventy-one years. The immediate cause of his death was disease of the lungs. His illness was not of long duration, and it was hoped until quite recently that he would be able to resume those duties which he had so satisfactorily discharged, not only as our corresponding secretary, but also as an efficient member of the standing committee of manufactures, science and arts; but the Great Disposer of Events has otherwise ordered.

Professor Renwick became a member of this Institute on the 10th day of May, 1841. He was elected its president in the year 1859. By his courteous intercourse with its members, he won their esteem, confidence and regard. His name is not unknown to fame in this country, nor elsewhere wherever science is appreciated.

He was born in the year 1792, and was graduated in Columbia College in 1807. In 1817, at the early age of twenty-five years, he was elected professor of chemistry in that institution, which position he occupied till the year 1854, though he did not devote the whole of his time to the laboratory. During the Presidency of Mr. Van Buren, he was selected by him as one of the commissioners to explore the northeastern boundary line between the United States and the British provinces, which resulted in the treaty made by the lamented Webster and Lord Ashburton in the year 1842.

As an author he was not less celebrated. His biography of Robert Fulton and David Rittenhouse were among his earliest efforts, nor did he neglect to write the memoirs of De Witt Clinton, while his own favorite study enabled him to publish text books on chemistry and philosophy which were very generally adopted for the use of schools.

Under these circumstances it seems proper that the members of this Institute should unite in a testimonial to perpetuate his memory. Therefore, be it

Resolved, That the members of the American Institute have heard with great grief of the death of James Renwick, LL. D., our corresponding secretary; that we mingle our mournful expressions in the loss which this afflictive dispensation of Divine Providence has produced in this community; and that, as a token of respect to his memory, the officers and members of the Institute now present will attend the funeral ceremonies to be performed this afternoon.

Resolved, That we offer our condolence to the bereaved family of our deceased member, and direct that a copy of the foregoing be transmitted to them by the recording secretary.

And be it further *Resolved*, That the proceedings in full be entered in the minutes of the Institute.

On motion of Vice-President D. S. Gregory,

Resolved, That the proceedings be published.

JOHN W. CHAMBERS,
Acting Recording Secretary.

At the stated monthly meeting of the Institute, held on Thursday, the 5th day of February, Mr. Wm. Hibbard, Vice-President of the Institute, rose and made some remarks in relation to the decease of our late corresponding secretary, and offered the following resolution, which was unanimously adopted.

Resolved, That the Rev. Dr. Campbell be requested to prepare and pronounce an eulogy to the memory and worth of our late president and still later corresponding secretary, Professor James Renwick, at our next stated meeting, or as soon thereafter as may suit his convenience.

At the stated monthly meeting in March, the Rev. Dr. Campbell delivered the following

Eulogium occasioned by the Death of the late Corresponding Secretary, Professor James Renwick, LL. D.

The American Institute has again sustained the loss of an honored member and a valued officer. James Renwick, Esq., LL. D., was, on the 12th of January last, called away from the scenes and activi-

ties of life, and from the office that he so honorably filled in this Institute, at the ripe age of nearly seventy-one years. Such an event naturally awakens a tender interest in all that distinguished him as a valued member of this Institute, a gentleman and a scholar, and excites a desire to perpetuate his name in the archives of an Institute that he so efficiently aided and adorned.

James Renwick, lately corresponding secretary of the American Institute, was born in Liverpool, England, on Thursday, the 30th of May, 1792. His father was a merchant of high respectability in the city of New York. He went on business to Scotland, and there married Miss Jeffrey, the daughter of a Scottish clergyman. After spending some years in Britain he returned to New York, our corresponding secretary being two years old. Mr. Renwick was educated in this city, and at a very early age showed a decided love for literary pursuits. At the early age of eleven years he entered Columbia College, and at the age of fifteen he graduated at the head of his class. At the age of twenty-one, in compliance with the dying request of Dr. Kemp, the eminent man who had been his preceptor, he took charge of his class, and carried the young men forward in their studies until they graduated with honor to themselves and their youthful teacher.

In 1817 then in his twenty-fifth year, he was appointed a trustee in Columbia College. This post of honor he held for three years, and resigned it only when he was appointed to fill the chair of natural philosophy and chemistry. To these branches were added geology and mineralogy, and for a long time he also taught the sublime science of astronomy. Mr. Renwick's close application to study, aided by a most retentive memory, enabled him not only to keep up with, but often to be in advance of the times, in those most difficult branches of human learning.

In 1838 he was appointed one of the commissioners for the survey of the northeastern boundary line; and it is well known to his private friends that his letters to an old and influential friend in England had much to do with the subsequent visit of Lord Ashburton to this country, and the friendly settlement of the question pending between the two governments. Many years before that he had made a barometrical survey of the Morris canal. In addition to all his scientific attainments, he was a fine classical scholar and a profound theologian. His knowledge, too, of painting and architecture was thorough. In point of fact, there was scarcely any branch of human knowledge with which he was not perfectly conversant. Such was the man over whose loss we now mourn.

The friends of James Renwick, the whole country, and especially the American Institute, may well feel that his death is no common

event. During a long life he stood prominently forward among the literary and scientific men of his day, and numbered among his intimate literary friends Irving, Cooper, and many other bright ornaments of American literature and science. The removal of such a man is an event of special interest to the community of which he was so long a useful and prominent member.

His contributions to science, and the aid and encouragement that he so long gave to the American Institute, make his death no ordinary event. He has passed away, but although the sun of life has gone down and the grave has closed over all that was mortal of James Renwick, his example and his works are left as a legacy to his friends and co-workers in the cause of science. Although we claim not for him a rivalship with a Newton or a Laplace, nevertheless he attained an honorable place among the scientific men of his day. His contributions to science, at least many of them, will probably remain a secret, yet he has contributed many valuable articles that may be found in the American Quarterly, published in this city.

Many of his leisure hours were employed to fill the fountain of scientific knowledge that is sending forth its streams to bless the world. How largely has human toil and suffering been mitigated by the labors of the student of science, and how largely have human comforts been increased by them. Little, too little, do men around the dwelling of the patient and unobtrusive student in the wide field of science, know their indebtedness to the man who is industriously exploring it or laboring to spread abroad its already collected stores. Many who now reap the rich results of a Fulton's discovery of the steam engine, never reflect upon the nights and days that his mighty mind labored, before his creative intellect brought to perfection and laid the noble trophy of his genius before the world. Its vast, its beautiful combinations, culminating in such a power to bless the world, lie far beyond the reach of common observation. It is the person whose mind has been enlightened by scientific knowledge, that can follow the workings of such a mind, or rightly appreciate the triumphs of such a genius. To carry men up to such a point, and to open such a rich field of intellectual wealth and enjoyment, was one of the constant efforts of the late lamented Prof. Renwick. His time and the resources of his mind, that many years of patient study had made rich in scientific knowledge, he not only with a free will, but with a peculiar pleasure, gave to advance the noble purpose of the clubs connected with this Institute. The energy of youth, that years were naturally making less powerful, seemed to be kindled anew, when he spoke of the purposes of these clubs, especially the Polytechnic. He hailed it as one of those powerful agencies that would foster and keep alive the ardor with which he desired to see young

men pursue the pathway that guided a Fulton to such a niche in the temple of fame, and that made him the benefactor of his race.

Years, if they had in any degree moderated the ardor of his mind in scientific pursuits, they had by no means extinguished the high purposes of his scientfic studies in early life. Till the sun of life went down so serenely beyond his three score years and ten, leaving not a speck to mar the beauty of the scene, he never lost his first love for his favorite studies, and now, when his venerable form has been removed from among us, it affords a true, although melancholy pleasure to preserve recollections so honorable to a departed friend, recollections too that may stimulate others to follow in a course of high and noble purposes.

This is not the place, and this is not the time to refer with any degree of minuteness to his works on scientific subjects or scientific men. They live to speak for themselves. This much, however, we wish and ought to say, that there is a grand practical purpose laid open in them all. His works on scientific subjects and scientific men, were regarded by himself as he meant they should be by every one, as merely stepping stones to conduct the youthful mind to an acquaintanceship with the important and delightful subjects of which they treat, and subjects too that promise so much good to the human family. By the labors of such men as James Renwick, the United States has risen to a point of greatness in scientific knowledge, as well as in moral and physical power, that ranks her among the foremost nations of the earth.

She has had her warriors and her statesmen that are assuredly inferior to few in other lands, and whose wisdom and heroism have been recognized throughout the world, but her men of science and literature have fully contributed their share to raise her to truest greatness and power; and now, when he has left us, now when his breath can no longer fan the fires that he so delighted to see burning upon the altars of science throughout the land, he has not left us destitute. He has left many noble sons of science who will continue to lay these offerings on the altars of science, that will keep them brightly burning. The belief of this pleasing thought must be confirmed in the minds of all who enjoy the pleasure of only occasionally attending the meetings of the Polytechnic Association of the American Institute. Even at the risk of offending good taste, it ought to be known, that at these meetings on every subject brought forward for discussions, there is an amount of talent and of knowledge displayed, that not only highly qualifies and enriches the mind, but fills it with admiration of the men who give so freely their time and the results of their laborious studies, to enlighten their fellow-citizens on such important subjects.

While such noble minds exist among us, that altar around which so many great men have stood, that altar that so early and so long held out such attractions to the lamented Renwick, is in no danger of falling into decay.

But while Prof. Renwick delighted to fan the fires of science, he also delighted to fan the flame of human liberty. The tree of liberty was by him as anxiously guarded as were the altars of science. That tree, planted amid the storms of a revolutionary contest, and moistened by the blood of so many great and good men, was a treasure that he highly valued, as giving shelter to the oppressed of every land, and the source, too, from which had sprung the greatness to which our country has arisen; and with painful emotions he witnessed the unhallowed efforts of misguided men to lop off some of the branches of that noble vine. This suicidal effort, and we trust an abortive one, filled him with poignant grief, and threw over him, I may say, the only shadows that darkened the evening of his days. He passed away from the land and the friends that he loved with a terrible war cloud hanging over them. But the last time that the writer of this exchanged sentiments on the subject, he spoke like a man with a strong and confident belief, that although for a season the sun of our national greatness and prosperity was partially obscured, the tree of liberty was too precious a plant, and too clearly an instrument in the hands of the Great and Benign Father of the human family, for promoting the good of his creatures, to be forsaken by him or left to wither and to die, scorched by the breath of misguided and ambitious men. That star that in 1776 arose in this western hemisphere, lighting up the hope of freedom among the nations of the earth—that star that has allured so many from homes of bondage and oppression, cannot, will not be suffered to sink into darkness, crushing the hopes of the millions that are yet longing to be free. No, we devoutly believe that the Friend of the oppressed will, with the breath of his mouth, dissipate the clouds that have for a season eclipsed its brightness, when with renewed splendor it will shed undecaying beams over a free, a great and a united people.

Mr. Hibbard moved that the thanks of the Institute be, and are hereby tendered to Dr. Campbell, for the exceedingly interesting and appropriate paper read by him, perpetuating the memory of our late Corresponding Secretary, and that he be requested to furnish a copy of the same for the use of the Institute; which was unanimously adopted.

REPORT

OF THE BOARD OF MANAGERS OF THE THIRTY-FOURTH ANNUAL FAIR.

The Board of Managers of the thirty-fourth Annual Fair of the American Institute respectfully report:

That on the 4th day of March last they organized, by the appointment of Mr. James C. Baldwin, as Chairman; Mr. Wm. H. Butler, as Vice-President, and Mr. John W. Chambers, as Secretary.

On the 18th day of March they completed the awards of the previous Board, which had been referred to them by the Institute.

The Board held a number of meetings during the spring, at which the subject of holding a fair in the fall was discussed, and a special committee spent some time in examining various locations suitable for holding an exhibition. No desirable place, in their opinion, could be obtained; and from the unsettled state of our country it was, after mature deliberation, deemed inexpedient to hold an exhibition during the year, and the Institute, at a meeting held on the 1st day of May, directed the Managers to prepare a schedule of subjects for competition, as last year, and to report the same to the meeting in June.

A list of subjects, with suitable premiums, was prepared and presented at a meeting of the Institute held in June, which was approved.

The following circular was printed and extensively circulated:

ROOMS OF THE AMERICAN INSTITUTE,
COOPER UNION BUILDING,
NEW YORK, *June 17th*, 1862.

The American Institute, of the city of New York, in order to give encouragement to ingenious citizens who are laboring for the improvement of agriculture, manufactures and the arts, has instructed the Board of Managers of the Annual Fair to report a list of premiums to be awarded during the year 1862, and after a careful examination of the whole subject, the Managers have agreed upon and selected the following subjects, which were considered worthy of the attention of the public at the present time, and in which improvements seem to be more particularly desirable.

To aid their judgment in this matter, the Managers have divided these subjects into two classes, and referred the one class to the

Polytechnic Association, and the other class to the Farmers' Club, requesting them to examine the articles or claims which may be brought before them, and to report on the same, in writing, to the Managers by the 31st day of December next; the Board reserving to themselves the right of ultimate decision on all questions relating to the premiums. No award will be made when in the judgment of the Board the competing article or essay falls below the standard.

To the Farmers' Club of the American Institute the Managers have assigned the following subjects:

1. For the best winter wheat, a new variety, equal to Mediterranean, one bushel to be exhibited ..... Silver Medal.
2. For the best spring wheat, a new variety, superior to any disseminated, one bushel to be exhibited . Silver Medal.
3. For the best oats, a new variety, superior to any cultivated, one bushel to be exhibited .... Silver Medal.
4. For the best twelve ears of field corn, ripening early and producing at least two ears to the stalk .... Silver Medal.
5. For the best peck of seedling potatoes, equal to the peach blow in quality for the table, and ripening earlier .... Silver Medal.
6. For the best seedling pear .... Silver Medal.
7. For the best seedling apple .... Silver Medal.
8. For the best seedling grape .... Silver Medal.
9. For the best essay on the culture of the pear ... Gold Medal.
10. For the best essay on the culture of the peach .... Silver Medal.
11. For the best essay on the culture of the grape, both under glass and out of doors .... Gold Medal.
12. For the best essay on the culture of the strawberry .... Silver Medal.
13. For the best essay on the preservation of ripe fruit . Silver Medal.
14. For the best plan of preserving fruit without sugar . Silver Medal.
15. For the best essay on the cultivation of the potato . Silver Medal.
16. For the best essay on the cultivation of asparagus . Silver Medal.
17. For the best essay on the cultivation of celery .... Silver Medal.
18. For the best essay on domesticating animals ..... Silver Medal.
19. For the best essay on poultry .... Silver Medal.
20. For the best mode of draining, accompanied by an essay on the value of the same on the various soils, with simple diagrams or plans, suggesting economical drainage .... Silver Medal.
21. For the best design for a forcing house for vegetables, propagating, raising seedlings, &c., all under the same roof .... Large Silver Medal.

22. For the best quarter cask of wine made from the grape, which can be afforded at $1 per gallon..Gold Medal.
23. For the best corn sheller that will not break the grain........Silver Medal.
24. For the best portable mill for grinding corn for farm use........Silver Medal.
25. For any improvement or new instrument, adapted to the farm and superior to any now in use ....Gold Medal.

To the Polytechnic Association of the American Institute the Managers have assigned the following subjects:

1. For the best machinery for spinning and weaving flax........Gold Medal.
2. For the best lifting and force pump, by hand power, Silver Medal.
3. For the best novelty in building materials, and machinery for preparing the same........Silver Medal.
4. For the best novelty of practical value extracted or manufactured from coal oil, coal tar, or petroleum........Silver Medal.
5. For the best samples of steel or semi-steel made direct from cast iron, with the process of manufacture, and the cost of producing the same..Gold Medal.
6. For the best novelty in the construction of railroads........Silver Medal.
7. For the best novelty in warming and ventilating buildings, having especial regard to health, safety and economy........Silver Medal.
8. For the best essay on the measure of power.....Silver Medal.
9. For the best original researches or monographs on any subject pertaining to the science of chemistry, or mechanics, or their practical applications........Gold Medal.
10. For the best samples of American manufactured flax fabrics, with the cost of manufacture....Silver Medal.
11. For a cheap and easy test of the true value of lubricating oils........Silver Medal.
12. For an easy and economical method of procuring the pure fatty acids from crude materials....Silver Medal.
13. For an important discovery or invention in photography........Silver Medal.
14. For the best original research upon the artificial formation of saltpetre........Silver Medal.
15. For an easy test of the detergent strength of soaps, Silver Medal.
16. For the best specimens of silver or gold plating on glass........Silver Medal.

17. For a cheap preparation of aniline colors........Silver Medal.
18. For a cheap preparation of metallic calcium....Silver Medal.
19. For a cheap preparation of silicium...........Silver Medal.
20. For a cheap preparation of magnesium..........Silver Medal.
21. For the best mode of constructing fire proof buildings..............................Silver Medal.
22. For a simple method of crystallizing sugar from sorghum..............................Silver Medal.
23. For the best water meter.....................Silver Medal.
24. For the best lamp to burn kerosene oil, producing perfect combustion........................Silver Medal.
25. For the best plan for burning kerosene oil for heating purposes..........................Silver Medal.

Three discretionary premiums (gold or silver medals), to be determined by the Board of Managers.

The grains and vegetables will be required to be exhibited at the Farmers' Club, on Tuesday, the 15th day of December next. Those deemed entitled to the premium will become the property of the Institute, and will be distributed at the Farmers' Club.

The new seedling fruit must possess sufficient merit to warrant their general cultivation. They may be presented at any meeting of the Club.

The essays must be designated by a *nom de plume*, which is also to be superscribed on an envelope, inclosing the name of the author. After the judges have decided upon those entitled to the premium, the rejected essays will be returned to the authors, with their accompanying envelopes unopened. The successful essays will be published in the Transactions of the American Institute; but the copyrights will remain with the authors.

Inventors and others wishing to bring before either of the Clubs herein named, any article for examination and competition, may present it at the rooms of the Institute, to Mr. John W. Chambers, Recording Secretary of the Board, at any time during business hours. Suggestions are especially invited from manufacturers, as to improvements desired in their own experience. All communications addressed to James Renwick, LL. D., Corresponding Secretary of the Institute, will meet with immediate attention.

The Polytechnic Association meets every Thursday, at 7½ o'clock, P. M., and the Farmers' Club every Tuesday afternoon at 1½ o'clock, at which times the articles or subjects presented will receive the attention and examination of the respective clubs.

The applications for the premiums were not so numerous as we anticipated, from which we are led to conclude that the public mind has been more absorbed on the subject of war than the more peaceful pursuits of science and agriculture.

The Polytechnic Association, to whom was referred the subjects appertaining to science, made a report recommending a number of premiums, but on account of some informalities was referred back for completion.

The Farmers' Club have not yet completed their labors, but it is expected that they will be able to report complete in a few days.

We respectfully ask that we may be discharged from the further consideration of the subject, and that the new Board of Managers to be elected on the 12th inst., have full powers to receive the reports and award the necessary premiums.

The Board of Managers cannot conclude their report without returning their thanks to the Polytechnic Association and to the Farmers' Club, for the attention which they have bestowed upon the various articles submitted to them.

All of which is respectfully submitted.

JAMES C. BALDWIN,
WM. H. BUTLER,
WILLIAM EBBITT,
THOMAS F. DE VOE,
JOHN V. BROWER,
GEORGE TIMPSON,
THOS. WILLIAMS, Jr.,
ANDREW BRIDGEMAN,
JOHN B. PECK,
F. W. GEISSENHAINER, Jr.,
JOHN JOHNSON,
WM. S. CARPENTER,
T. B. STILLMAN,
GEORGE PEYTON
JAMES KNIGHT,
WM. COTHEAL
HENRY STEELE,
GEORGE M. WOODWARD,
GEO. R. JACKSON,
JAS. R. SMITH,
CLARKSON CROLIUS,
GEO. C. MANN,
JOHN G. BERGEN,
J. S. UNDERHILL,

Managers.

NEW YORK, *February* 4, 1863.

REPORT

OF THE BOARD OF MANAGERS OF THE THIRTY-FIFTH ANNUAL FAIR OF THE AMERICAN INSTITUTE.

The Board of Managers of the Thirty-fifth Annual Fair of the American Institute respectfully report:

That on the fifth day of February, 1863, the Board of Managers of the Thirty-fourth Annual Fair made a report to the American Institute, stating that they were unable to make a final report of their proceedings, and asked that permission be given to the new Board of Managers to be elected on the 12th of February, to act upon the reports and the premiums, and conclude the proceedings of the year.

The American Institute considered the recommendation and referred the whole subject to the new Board of Managers, and they herewith submit the reports made, and the premiums they have awarded, consisting of one gold medal and six silver medals.

Respectfully submitted,

WM. H. BUTLER, *Chairman.*

JOHN W. CHAMBERS, *Secretary.*

NEW YORK, *April* 29, 1863.

REPORT

OF THE POLYTECHNIC ASSOCIATION.

The Polytechnic Association of the American Institute report:

That in conformity to the circular issued by the Board of Managers, a number of articles were submitted to the Association for examination.

These several articles were referred to the mechanical and chemical sections of the Association.

The accompanying reports were made by the sections to a meeting on the 25th day of January last, and were adopted as the report of the Polytechnic Association to your Board.

Respectfully submitted.

SAMUEL D. TILLMAN,
Chairman of the Polytechnic Association.

February 19, 1863.

REPORT
OF THE CHEMICAL SECTION.

The chemical section respectfully report that they have attended to the duty assigned them in the examination of the following subjects and instruments submitted to them as having been presented for premium in the chemical department.

One essay on the artificial formation of saltpeter, entered for premium No. 14.

Two sizes of Vidal's coal oil lamps for burning kerosene oil without chimneys, entered for premium No. 24.

One of Fish's nursery lamps and boiler, and one of Fish's tea and coffee boilers and cooking apparatus, both employing kerosene oil as the fuel for producing the heat. Part of an apparatus illustrating Prof. Seely's plan for burning kerosene oil as a fuel.

These three last named articles were entered for premium No. 25.

There were also entered four instruments for testing the volatility of coal oils and burning fluids, to compete for a discretionary premium. One by T. Godwin, one by John Tagliabue, one by Prof. Seely, and one by Giuseppe Tagliabue.

As regards the essay on the artificial formation of saltpeter the section are of the opinion that it does not contain sufficient original practical matter to fulfill the requirements of the offer for premium No. 14.

In the experiments with Vidal's lamps it was found that they did not produce perfect combustion when burning kerosene oil, and therefore they do not meet the requirements of the offer for premium No. 24.

The section have examined the apparatus illustrating the plan for burning kerosene oil for heating purposes, invented and presented by Prof. Seely. It appears to be based upon correct principles; there also appears to be a large amount of ingenuity displayed in this method of producing heat from the burning of kerosene oil; and the section are of the opinion, from the examination of the part of the apparatus that was exhibited to them, that Prof. Seely has done himself and his invention great injustice in not having exhibited his apparatus in such form that would have enabled the section to practically test its value.

The two apparatus presented by Mr. Fish, severally called

"Fish's nursery or night lamp," and "Fish's tea and coffee boiler and cooking apparatus," the section regard as very ingenious and useful for the purposes for which they are designed, and a successful and economical application of the burning of kerosene oil for the purposes of heating and cooking. They therefore recommend that the premium No. 25 be awarded to Mr. Fish for the two apparatus above named.

The section have carefully examined the instruments designed to test the volatility of coal oils and burning fluids. In their opinion the coal oil pyrometer of Mr. Giuseppe Tagliabue is the best that was presented to them. They found that this instrument could be easily operated by any person of ordinary intelligence; that it is durable and not likely to get of order, and can be used readily in exposed situations, and that it will accurately and plainly indicate the relative volatility of different oils and burning fluids. They therefore recommend that a silver medal be awarded to Mr. Giuseppe Tagliabue for his coal oil pyrometer. All which is respectfully submitted.

The above report was adopted in the section unanimously.

JOHN B. RICH, *Ch'n and Sec'y.*
AUSTIN CHURCH,
ENOS STEVENS,
DUBOIS D. PARMELEE,
FRANK DIBBEN.

January 22, 1863.

REPORT

OF THE MECHANICAL SECTION.

The mechanical section of the Polytechnic Association beg to report: That but few inventions or improvements have been presented for the inspection and report of this committee, notwithstanding that the matter was extensively advertised in the public journals. This, in the opinion of the committee, may be attributed to the preoccupation of our inventors and mechanics in the present unhappy struggle; and they venture to hope that, under other circumstances, next year may be different.

Your committee report, that the following improvements were submitted, and that one or other of the committee personally inspected them:

1st. "Fontayne's photographic machine, for rapidly multiplying photographic pictures from negatives."

Several of your committee visited the inventor at his rooms, on Broadway, and had the operation of the machine explained to them. The operation is carried on by means of a mechanical contrivance, by which portions of the surface of an extremely sensitive sheet of photographically prepared paper, and made to pass in succession underneath an aperture, in which is fixed, in a movable socket, the negative to be printed from. Condensed light is thrown into this aperture, every opening and closing of which occupying from a second to a fraction of a second of time, according to the speed at which the machine is driven, constitutes an impression or positive, which is finished in the usual manner.

In the opinion of your committee it is an ingenious and beautifully adapted piece of mechanism, and perfectly answers the purpose intended; and is, they believe, the first machine ever applied to the multiplication of photographs, and seems to supply a want hitherto felt, namely, a cheap and rapid mode of illustration; a desideratum of great importance, not only to book publishers, but to the advertising public; a thousand copies of an engraving or wood cut made in this machine costing but little more than one copy made in the usual manner, as stated by the inventor.

The machine being in successful operation, and satisfactory results having been exhibited to your committee, they respectfully recommend that *a gold medal* be awarded to the inventor, as a mark

of appreciation by the Institute of the scientific and mechanical skill exhibited by him.

2d. "Cregan's improved calipers."

This instrument was neatly made and finished, and differs from those in common use, in having the points so arranged as to be exactly opposite to each other when closed. This was effected by having one of the limbs double, united at the points by a pin serving as an axle to a small roller, this small wheel or roller constituting one of the points.

Your committee came to the conclusion that the position of the points might be some advantage, and was a novel feature in calipers, but objected to the wheel, which, requiring to revolve with freedom on its axle, destroyed that nicety of measurement which mechanics' expect from such an instrument. Under these circumstances your committee do not feel called upon to recommend any award, but would compliment the neat workmanship displayed in the manufacture of the tool.

3d. "J. R. Fergusson's heating and ventilating system for buildings and refrigerators."

This system consisted in making the walls and roof of the apartment containing the stove or heater double, and introducing the cold air into the double skin of the roof at one side; from the roof and communicating with this jacket, a series of tubes descending to within a few inches of the floor; the cold air passes down through these tubes into the hot chamber, having previously taken up whatever heat was being radiated into the jacket from the inner skin of the chamber. The inventor claimed that a great saving of fuel was thus effected, and that the air became thoroughly heated without the disagreeable odor which usually arises from furnaces when highly heated.

The inventor not having exhibited a working model, and being unable to exhibit his system in successful operation, your committee, while acknowledging the apparent merit of some of its features, do not feel justified in making any recommendation for a medal.

4th. "Shaw's patent sash fastener."

This your committee considered ingenious, but a little complicated, effecting perfectly the intended purpose, however; but as no evidence as to durability was advanced by the inventor, they do not consider that at this time a medal should be awarded.

5th. "Wood's photographic engraving."

This invention being evidently (from the samples exhibited) still incomplete, your committee prefer at this stage not to pass an opinion upon it.

6th. "Koch's water meter."

Only a sectional drawing having been exhibited of this invention, your committee could form no opinion as to its merits, in the absence of the inventor, who is reported to have deceased.

7th. "Essay on the promotion of dormant inventions," by "Solon Archimedes."

Your committee would make honorable mention of this paper, but do not think it covers the ground, proposed by the Institute, sufficiently to merit a medal.

8th. "Barrel elevator," at the Metropolitan mills, by "Henry Waterman."

Several of your committee examined this apparatus, and found it in successful operation daily, effecting a great saving of time and labor.

The apparatus consists of an endless band of India rubber belting passing vertically over an upper and lower drum, driven by a belt from a pulley; to this band, which is nearly the width of a flour barrel, a series of projections, supported by springs, are attached; on these projections the barrels are placed, and ascend with the belt to any floor required, through a special series of hatchways. At each hatchway an arrangement is made for causing the shelf or projection carrying the barrel to tip or depress, and the barrel rolls off on the floor or wagon, as the case may be. It also serves for lowering barrels from one floor to another, and is altogether a successful mechanical adaptation, and reflects great credit upon its projectors.

Your committee recommend that a silver medal be awarded to the inventor.

In conclusion, your committee regret that so few inventors have thought it expedient to compete for the annual prizes offered by the Institute, in recognition of mechanical talent. The number and value of the inventions exhibited at the weekly sittings of the Polytechnic Association, are a sufficient proof that our brethren are not idle in this peculiar field; yet the task imposed upon your committee has been a light one, as the records exhibit. Such as it has been, however, your committee have endeavored, without prejudice or favor, to perform it to the best of their ability.

WARREN ROWELL, *Chairman*,
WM. H. BUTLER,
THOS. D. STETSON,
J. WYATT REID, *Secretary*.

NEW YORK, *January* 22, 1863.

REPORT
OF THE FARMERS' CLUB.

The following reports were made by special committees appointed by the Farmers' Club to examine the various articles submitted to them for premiums. They consist of the following:

An Essay on the cultivation of the Potato.

An Essay on the culture of the Pear.

An Essay on the culture of the Strawberry, Seedling Potatoes and Seedling Grapes.

The Club respectfully recommended that the premiums be awarded.

EDWARD DOUGHTY, *Ch'n.*

JOHN W. CHAMBERS, *Sec'y.*

NEW YORK, *February* 3, 1863.

REPORT OF SPECIAL COMMITTEE ON THE ESSAYS ON THE CULTIVATION OF THE PEAR, AND ON THE CULTURE OF THE STRAWBERRY.

Two articles, one on the cultivation of the pear, signed "PRACTICE," the other on the culture of the strawberry, signed "KENTUCKY," have been submitted to a committee appointed by the Farmers' Club.

Both treatises are quite lengthy, and contain some useful suggestions. The article on the pear, as a literary composition, is destitute of merit, though presented to the committee with numerous corrections on its face. The committee have failed to discover in it anything new or valuable to entitle it to your consideration.

The other, "Culture of the Strawberry," is divided in three parts:

1. *On the Preparation of Soil.*—The author's views coincide with the best practice, but the theory does not differ from that which is well known and already before the public.

2. *On Garden and Field Culture.*—The author is profuse and prolix, but not in all cases clear in his statements. His mode for field culture, though novel, is believed in a measure to be impracticable and too expensive.

3. *On Propagation, Hybridization, Forcing, etc.*—This part of the Essay contains some excellent suggestions, the result of the expe-

rience of the author; but, taken as a whole, your committee do not feel warranted in recommending it to a premium.

Respectfully, JOHN G. BERGEN,
R. G. PARDEE,
Committee

Report on an Essay on the Culture of Potatoes.

The committee appointed by the Farmers' Club, to report upon "An Essay on the Culture of Potatoes," beg leave respectfully to report:

That they have critically examined an essay presented for the premium of the Institute, and endorsed "New Jersey," and find it to be a full and valuable paper. This essay includes all the pertinent and efficient points of culture now known, while the descriptive portions are worthy the approbation of your committee. The remarks on the use of tools and preparation of the soil are equally approved, while the remarks on storing, preserving, etc., are full and efficient.

Your committee would suggest the propriety of awarding to this essay the silver medal of the Institute.

JAMES J. MAPES,
R. G. PARDEE,
JOSHUA WEAVER,
New York, *February* 3, 1863. *Committee.*

Report on Seedling Potatoes.

The committee to whom was referred the specimens of seedling potatoes, presented by Mr. D. A. Bulkeley, Stone Hill Farm, Williamstown, Mass., respectfully report:

That three varieties of seedling potatoes were exhibited, viz: the Bulkeley Seedling, the Prince of Wales, and the Monitor.

The exhibiter furnishes the following information in relation to these potatoes:

The Bulkeley Seedling has been cultivated for the past three years with entire satisfaction; they are light red in color, and keep well.

This potato grows very large vines, and produces good sized potatoes, often ten to fourteen fit for the table in a hill.

The other two varieties are new, and were distributed last spring for the first time. The Prince of Wales is a very large white potato, very early, and are a fine variety for baking.

The Monitor is also a very large potato, with a pink eye. They

keep well, and are not apt to sprout; they spread a little more in the hills than the other varieties, and are very superior, both for boiling and baking.

The above potatoes were exhibited at the Farmers' Club on the 2d of December last, and were much admired. One of your committee tried the various kinds for table use, and reports very favorably of their cooking qualities.

Mr. Bulkeley has devoted much time and attention to the improvement of this valuable esculent, and your committee take great pleasure in recommending that the silver medal of the Institute be awarded to him for the best peck of seedling potatoes.

Respectfully submitted.

JAS. J. MAPES,
WM. S. CARPENTER,
Committee.

NEW YORK, *January* 31, 1863.

Report on Seedling Grapes.

The committee to whom was referred the specimens of seedling grapes offered for premiums, respectfully report:

The two specimens offered to the inspection of your committee were, the Adirondac grape, from Mr. John W. Bailey, of Plattsburgh, Clinton county, N. Y., and the Fancher seedling grape, from Mr. F. B. Fancher, of Lansingburgh, Rensselaer county, N. Y.

Your committee have given the subject due consideration.

THE ADIRONDAC GRAPE.

The bunches and berries of this grape are of a very large size; the berry is round and slightly transparent; the quality is very good, being sweet and pleasant, pulp very tender, parting very readily from the seed; resembling somewhat the Black Hamburgh in color.

The vine was found growing in the grounds of Mr. J G. Witherbee, at Port Henry, forty miles north of Whitehall, in latitude 44 deg. The hills at the base of which the vine grows are some 200 feet high, and shelter it on all sides.

The vine is similar in appearance to the Isabella; the points of difference noticed may have been owing to the difference in exposure and training; but it is earlier in ripening—the large size of the bunches and berries, and the lighter color of the fruit; the clusters are very compact, and the berries nearly round, while the Isabella is oblong. The leaf is larger, rougher and thicker than the Isabella, and the wood is long jointed.

THE FANCHER SEEDLING GRAPE.

This is a good grape; it has all the characteristics of the Catawba, and your committee and others, without being informed that it was a new grape, pronounced it the Catawba. From the small quantity of grapes sent, and the late period at which they were received, your committee consider injustice would be done the exhibiter by passing judgment upon it this year.

We therefore recommend that the silver medal of the Institute be awarded to Mr. John W. Bailey for the Adirondac grape.

Respectfully submitted.

JOSHUA WEAVER,
WM. S. CARPENTER,
A. S. FULLER,
Committee.

NEW YORK, *Feb.* 2, 1863.

ESSAY ON THE CULTURE OF THE POTATO.

BY P. T. QUINN, OF NEW JERSEY, FOR WHICH THE SILVER MEDAL OF THE AMERICAN INSTITUTE WAS AWARDED.

The potato is a native of South America, and in the vicinity of Quito is known under the name of papas. It was cultivated in Virginia as early as 1584, and the colonists made free use of it as food.

The potato is a species of a very large family of plants to be found almost everywhere. Some individuals of this extensive family are poisonous, while others, such as the egg plant and the tomato, have yearly gained favor, until at present they are extensively used.

For many years past the potato has been subject to a disease known under the name of the rot. There are three or four forms in which this disease makes its appearance, such as the dry, black and wet rots. Since this difficulty first assailed the potato crop almost every person who cultivated a rod of ground has tried experiments in the hopes of finding some specific to prevent its ravages. Although thousands of pages have been written emanating from various sources, each proposing remedies, still no definite remedy is yet known. Some varieties are less subject to this disease than others. For instance, I have grown Prince Alberts and Mercers on the same piece of ground, both kinds received the same treatment, culture, manure, etc., etc., and while four-fifths of the latter was destroyed by the rot, the former were sound and free from disease.

Early planting has been practiced by many who grow this crop for profit, and from my experience, and what I have collected from others, the plan is quite likely to prevent disease.

Another and very important point should receive the cultivator's attention: this is, to free the soil from any stagnant water, and to have the ground replete with sufficient available material to perfect the crop. Some writers have asserted that the rot was an inherent disease, and that water was an agent in its development. There seems to be some truth in this statement, for I find that potatoes begin to decay first in low or moist places.

VARIETIES.

The kinds of potatoes cultivated in different parts of the country are too extensive for me to catalogue in this paper. I will merely mention the popular varieties that are grown to supply the demand of some of the northern cities.

Among the early varieties of known reputation are the following: Early Junes, Dykemans, Algiers, Buckeyes, Davis' Seedling, Jackson Whites, Pellham's Seedling, (recently introduced and very early). Of the late sorts are the White Mercers, N. J. Mercer, Peachblows, Prince Alberts, Rough and Ready, Western Reds, Carters and Blue Mercers.

Many varieties that were grown for home consumption and market purposes ten years ago have been since discarded, owing to various causes, such as their propensity to rot, small yield, lateness of ripening, etc. The Mercer potato is probably more subject to rot than any of the above mentioned kinds, still it has such a high reputation for quality and flavor, it usually bringing the highest market price, its cultivation still continues. The Peachblow, a potato introduced a few years ago, has rapidly gained popularity, and now ranks as a fine quality potato. It grows to a large size, yields paying crops, besides being well flavored. The only serious objection to its culture is that to mature it requires the whole season. With market gardeners this is a great fault; they usually harvest the potato crop early enough to sow spinach, turnips or sprouts, but with the Peachblow this cannot be done.

The Prince Albert is another variety of recent introduction and now extensively cultivated. It bears different reputations for quality in different localities. In some districts it is considered fair, in others very poor. All agree, however, to its very large yield per acre. A responsible farmer who has cultivated potatoes for a number of years, told me a short time ago that it would pay him better to grow Prince Alberts and sell them at twenty-five cents per bushel, than to sell Mercers at the usual market price.

Where the Prince Alberts are grown on a clay loam and the land is in good heart, the quality of the potato is fair. On such soils

the yield is very large; I have frequently grown 300 bushels of this variety to the acre.

The Buckeye has been cultivated quite largely in some parts of New Jersey, and it is spoken of highly by those who have grown it. There is a serious objection to this kind; when the potato is grown to a large size it becomes hollow in the center; this causes it when cooked and cut open to have an unsightly appearance.

PREPARATION OF THE SOIL.

The potato appears to do well on nearly all soils, if properly prepared and manured. In the southern counties of New Jersey, on their sandy soils, they grow fine potatoes, using no other fertilizer but green sand marl, which is found in great abundance in that district. The potato also yields abundantly on the clay soils when deeply cultivated and freely fertilized. For the latter class of soils fall plowing is very essential, as the alternate freezing and thawing during winter leaves it in fine tilth for spring. When the land is sufficiently dry in April to work, plow and fallow in the same furrow with a lifting subsoil plow, and continue to do so until the field is done. Sandy soils may only receive the latter treatment as fall plowing will not materially benefit them.

When the ground is plowed, harrowed, cultivated or otherwise disturbed, mark out furrows three feet apart with a double moldboard plow, about six or eight inches deep. When it is not convenient to subsoil after the surface, then run a one-horse subsoil in the bottom of the furrow when opened.

The manure is then spread, and in the drills the potatoes dropped from eight to ten inches apart in the rows and covered with about three inches of soil. When the plants are four inches high a few inches more of covering may be added.

SELECTING SEED.

The usual mode among farmers is to cut their seed potatoes in pieces, leaving one, two or three eyes to each piece, and cutting a few weeks before the time of using them, so that an artificial skin may be formed by the drying of the exuding starch, before being placed in the ground. Others plant small potatoes, selling or otherwise disposing of the large ones. They claim that as large a crop is produced from cut or small potatoes as when large seed is used. It is evident that if the small potatoes are constantly used for seed, the quality and quantity must lessen each year.

My own experience has been in favor of a directly opposite method; the largest crop of potatoes I produced was from planting whole seed, not less in size than a hen's egg, planted in ground

prepared in the way described. The same conclusions have been arrived at by many others, who have carefully experimented on the culture of potatoes. Among those, I may mention the series of experiments made on the Island of St. Helena many years ago. Gen. Beatron planted all sizes of potatoes, and from one inch to twenty inches in depth; he obtained the best yield from large whole seed and those covered with six inches of soil. The experiments were afterward corroborated by the Phalanx in Monmouth county, N. J., and by many others since.

MANURES.

The potato draws from the soil large quantities of potash and phosphates, and this should be kept in view when composting manure intended for potatoes, or when purchasing a fertilizer. In Monmouth county, N. J., fine potatoes are grown on the sandy soils, with no other fertilizer than marl, which abounds in large quantities in that part of the State. The analysis of this marl shows that potash is its leading constituent. It also gives phosphate, in less quantity.

The following analysis of the potash shows its requirements, in the soil, to produce a large crop:

Potash	40.52
Muriate of potash	3.25
Soda	.26
Common salt	2.24
Lime	2.96
Magnesia	8.09
Peroxide of iron	5.10
Silica	4.66
Sulphuric acid	3.71
Phosphoric acid	11.83
Carbonic acid	9.18
Carbon and sand	7.50
Loss	.60
	99.90

From the above figures it may be easily ascertained what constitutes a good manure for potatoes.

Prof. Mapes recommends the following as an excellent stimulant for potatoes: one cord of muck, four bushels of salt and lime mixture, and one hundred pounds niter superphosphate of lime. He says: "With such a compost, potatoes may be raised more economically, and with greater certainty of success, than with stable manures; the liability to disease will also be lessened, as such a compost is not putrescent in its character."

Barn-yard manure, when thoroughly decomposed with muck, head lands or charcoal, and applied in the drill at the time of planting, or spread broadcast and plowed under, make a good manure for potatoes. I prefer the latter method of application, as the manure

is not brought in direct contact with the young tubers. This last method is very expensive, as it requires from twenty-five to thirty two-horse wagon loads to the acre to produce an average yield. Common raw muck is a good manure for potatoes, and strange to say it is almost worthless in that state for any other crop.

CULTIVATION.

The cultivation of potatoes means, in plain terms, to keep the ground loose and entirely free from weeds. It is to the farmer's interest to accomplish these objects at the least possible cost. This may be done by the use of the lifting subsoil plow, and Knox's or Howes' horse hoe. When the young vines are three or four inches above the surface, run a horse hoe between the rows to level the ridges, as the ground between is higher than the rows. The loose earth falling between the young stock, prevents the weeds from appearing directly in the rows. Then run the subsoil plow on either side of the rows to a depth of six or eight inches—this operation leaves the soil in nice order. In eight or ten days later the horse hoe is again used, running close to the rows; the share so managed as to throw some loose earth between the stock at each cultivation. When the vines are eight or ten inches long, the subsoil plow may again be used, running the same as the first time. The remainder of the culture may be done with the hand hoe.

By adopting this method of culture no hand tools are required, and the expense is lessened at least twenty-five per cent. As soon as the blossoms appear, all cultivation should cease; by disturbing the vines after that time the crop is materially injured.

GATHERING THE CROP.

This operation, which used to be so tedious and laborious, is, since the introduction of the horse potato digger, made an easy task. I have used Allen's patent, and although not perfect by any means, still I have taken out with this machine, one pair of horses and eight persons, 250 bushels potatoes per day, and had to stop the team early in the afternoon for want of more help to pick up. This digger resembles a double moldboard plow with the moldboard cut out in long bars or rods, leaving a space of two inches between the rods. In using it a horse walks on either side of the row of potatoes, and the digger goes under the potatoes; the fine earth falling between the bars and the potatoes are left on the surface. It is best to take out every alternate row first and then take out those left. When the field has been gone through in this way the digger is again run in each row to be sure the potatoes are all out.

STORING.

Potatoes should be stored when thoroughly dry, and in sandy or dry soils they may be placed in shallow pits, and covered with a mound of earth to protect them from frost. Before covering with soil a layer of straw should intervene, with an occasional tuft projecting to the surface so as to part with excess of moisture and prevent heating. They may also be kept in a cool and well ventilated cellar if perfectly dry, but in all cases they should be shielded from the light, as its presence produces solanum, or that active, poisonous, bitter principal found in potato sprouts or in the green skins of potatoes exposed to the influence of light.

Premiums Awarded by the American Institute, 1863.

AGRICULTURAL.

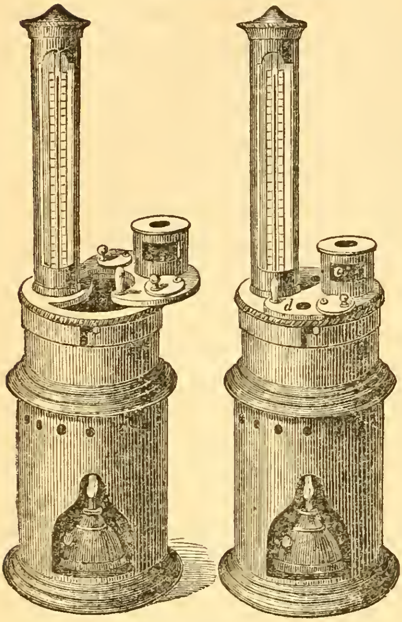
P. T. Quinn, Newark, N. J., for an essay on the cultivation of the potato .... Silver Medal.
D. A. Bulkeley, Williamstown, Mass., for seedling potatoes .... Silver Medal.
John W. Bailey, Plattsburgh, N. Y., for the Adirondac grape .... Silver Medal.

MECHANICAL.

Charles Fontayne, No. 561 Broadway, N. Y., for a rapid photographic printing machine .... Gold Medal.
Wm. L. Fish, Newark, N. J., Wm. D. Russell, agent, No. 206 Pearl street, New York, for a successful and economical application of the burning of kerosene oil for the purposes of heating and cooking .... Silver Medal.
G. Tagliabue, No. 208 Pearl street, New York, for a coal oil pyrometer .... Silver Medal.
Henry Waterman, No. 239 Cherry street, New York, for a barrel elevator, used at the Metropolitan Mills .... Silver Medal.

Giuseppe Tagliabue's Patent Coal-Oil Pyrometer,

For which the Silver Medal of the American Institute was awarded.



This cut represents two views of the Coal-Oil Pyrometer. The first one is as it appears when it is ready to test the burning point of the oil, with the sliding cover turned one side; and the second view is when it is ready to test the explosive point of the *vapor* of the oil. The lower part of the instrument contains a bath of water, with a lamp beneath, for the purpose of heating the water. Within the water bath is a cup for containing the oil which is to be tested. Over this water bath and oil cup is a cover with a thermometer through it, and reaching down into the oil in the cup. The short cylinder on the sliding cover is for collecting the *vapor* of the oil when testing its inflammability. When the oil to be tested is placed in the oil cup, the lamp is lighted (burning with a small flame) and placed under the water bath, and the water and oil is gradually heated. The oil emits a vapor in proportion to its volatility. This vapor mingles with the atmospheric air, which is admitted through two perforations (marked *d* in the sliding cover), and thus forms an explosive mixture that ascends into the cylinder on the sliding cover; and on applying a lighted taper a slight explosion or puff of flame will take place, and on simultaneously inspecting the thermometer the temperature of its inflammability will be ascertained. After turning the sliding cover one side, as in the first view, and holding the lighted taper in contact with the escaping vapor till the oil ignites, on looking at the thermometer the burning point will be noted.

DIRECTIONS FOR USE.

1. Lift off the cover, take out the oil vessel, and fill the water bath with water until the surface is just a quarter of an inch above the *bent* ends of the wires, or the support for the oil cup.

2. Fill the oil vessel with oil until it rises to within a quarter of an inch from the top of the vessel, or level with the top of the ring for the thermometer; then replace the oil cup within the bath, observing to press the projection on it into the groove or notch.

3. Insert the thermometer in its ring and secure the cover to the pins outside. (See the second view.)

4. Half fill the small lamp with alcohol, trim it so as to produce as small a flame as possible, light it and put it in its place below the water bath.

5. Allow the mercury to rise to within ten or fifteen degrees of the temperature at which the oil is to be tried, or at which it is expected to vaporize; then remove the lamp, and open the two valves which have previously closed the small openings *d d* in the cover of the instrument, so as to permit the entrance of atmospheric air, and its mixture with the vapor arising from the oil.

6. Then insert a lighted taper through the orifice *c* in the cylinder and a faint puff or small explosion of vapor will occur if the lowest explosive temperature of the oil has been reached. As soon as this puff is seen, the thermometer must be carefully examined, and the mercury will indicate the precise degree at which the oil produces an explosive mixture with atmospheric air.

7. If the taper does not cause a "puff," replace the lamp within the stand, and let it remain there a few seconds, until the mercury first begins to rise, then withdraw the lamp, and again apply the taper to the orifice *c;* but if still no "puff" occurs, repeat the operations described in this paragraph until it does so.

8. When it is desired to ascertain the temperature of the coal oil at the point of its ignition on the approach of a flame, first take out the lamp, turn the sliding cover till the surface of the oil is exposed to the air (see first view;) then replace the lamp beneath the water bath and watch the thermometer until the mercury has reached the degree shown by the first experiment. Remove the alcohol lamp, then repeatedly apply a small flame at the level of the edge of the oil vessel, and as soon as the oil begins to burn the thermometer will truthfully exhibit the exact temperature at which the oil becomes inflammable. In making this experiment, vapor will occasionally collect and escape over some single spot in the oil; it is here where the flame should be applied, and it should never be held longer over one spot than a few seconds. The alcohol lamp may be replaced if necessary, as in the first experiment, as in direction seven.

9. After the alcohol lamp is removed, the thermometer rising one degree per minute, will be best suited for uniform observation.

N. B. Care must be taken to follow the exact measures of oil mentioned in direction two—neither more nor less.

Fish's Patent Lamp Heating Apparatus,

For the economical application of the burning of kerosene oil for the purpose of heating and cooking, for which the silver medal of the Institute was awarded.

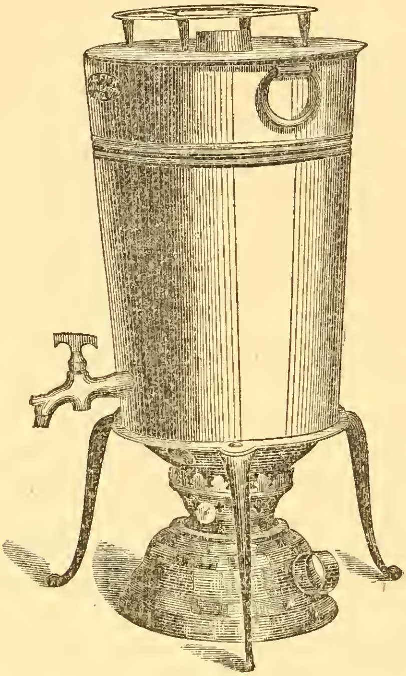


Fig. 1.

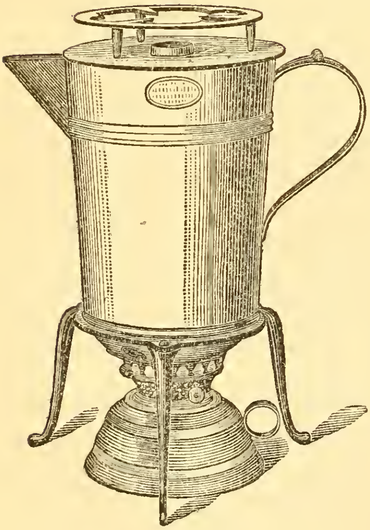


Fig. 2.

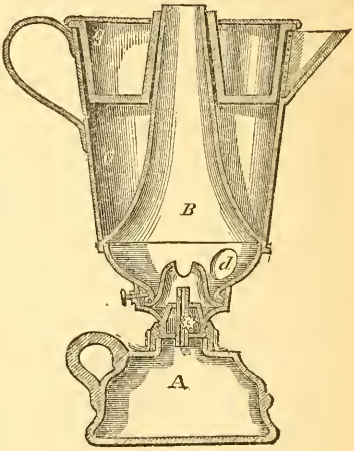


Fig. 3.

Ever since the discovery of the inexhaustible oil wells in Pennsylvania, petroleum has been produced in quantities so large as to

cause it to be offered at such very low prices that extraordinary efforts have been made to use it for heating as well as for illuminating purposes. Were it not for the disagreeable odor and the smoke which result from its combustion, it would afford a cheap substitute for the spirit lamp in chemical laboratories, and for gas in culinary operations; indeed, its very low cost would probably cause it to be used to a large extent for cooking in summer, in place of wood and coal. Many plans have been suggested for producing so perfect combustion of rock oil that no smoke would be emitted, but, so far as we are aware, none of these has been entirely successful—at all events, in its application to heating purposes. By the plan which we here illustrate the inventor claims the combustion to be absolutely perfect, so that not a particle of unconsumed smoke is left.

It consists simply in placing a metal chimney over the flame; and to avoid the great waste of heat which would occur from radiation from the walls of the chimney, the chimney is carried through the vessel to be heated. The engravings represent the plan as applied to a tea and coffee boiler, Fig. 1, and to a nursery lamp, Fig. 2; a section of the latter being shown in Fig. 3. A is the lamp, B the chimney, and C the vessel of water surrounding the chimney. *g* represents a porcelain cup which may be placed within the receiver and used for keeping food warm through the night. A hole is made in the side of the chimney, on a level with the flame, and filled with a plate of mica, *d*, through which the flame may be observed in adjusting its height to give us the amount of heat required. As a considerable portion of the heat passes up through the chimney, arrangements are made te utilize this heat, which would otherwise be lost. Accordingly, a light iron stand, as seen in Figs. 1 and 2, is constructed to support a vessel of water, or any other cooking dish, directly over the top of the chimney. The inventor says that he has fried meat in the nicest manner by placing a frying pan on this stand.

PROCEEDINGS OF THE FARMERS' CLUB.

RULES AND REGULATIONS OF THE FARMERS' CLUB OF THE AMERICAN INSTITUTE, ADOPTED BY THE COMMITTEE OF AGRICULTURE.

1. Any person may become a member of this Club, and take part in the debate by simply conforming to its rules.
2. Any member for disorderly conduct may be expelled by a vote of the majority.
3. The minutes of the Club, notices of meetings, etc., shall, as formerly, be under the control of the
4. The Club shall be called together Tuesday, at 1½ o'clock P. M., of each week.
5. A chairman pro tem. shall be chosen at each meeting.
6. The first hour of the meeting may be devoted to miscellaneous subjects, as follows: papers or commuuications by the Secretary, communications in writing, reports from special committees, subjects for subsequent debate proposed, desultory or incidental subjects considered.
7. The principal subject of debate shall be taken up at 2½ o'clock (but may be introduced earlier by a vote of the meeting), and continue until 3½ o'clock unless a motion to adjourn prevail.
8. No person shall speak more than fifteen minutes on the principal subject unless by consent of the meeting.
9. All controversy or personalities must be avoided, and the subject before the meeting be strictly adhered to.
10. Questions pertinent to the subject of debate may be asked of each through the chairman, but answers must be brief, and not lead to debate.
11. The chairman may at any time call a person to order, and require him to discontinue his remarks.
12. When any committee is appointed by the Farmers' Club, the members of said committee shall be members of the American Institute.
13. No discussion shall be allowed that is not connected with the great subjects of Agriculture and Rural Improvement.

May 5, 1862.

Mr. Adrian Bergen, of Long Island, in the chair.

HALL'S PEDIGREE WHEAT.

Mr. Wm. S. Carpenter.—Last year I had a number of varieties of wheat sent me to experiment with. These specimens I planted in an exposed situation. One variety, which has a great reputation in England, known as "Hall's Pedigree," is likely to prove hardy and productive in this country, and I think it very suitable for our climate. Sixty bushels per acre have been grown in England of this new variety of wheat. I also had two varieties of barley, one of which, called "bald barley," has stood the winter, and I think it will be a valuable addition to our cereals.

Diseases of Fruit Trees.

Wm. H. Pettis makes the following inquiry:

I would like to hear, from your Farmers' Club, something upon the following statement of facts: I have a fine, thrifty pear tree in my yard, which bore last year, for the second time, about a half bushel of pears. Last spring I washed the bark with ley and soap, wound a cloth round the body of the tree to protect the bark from our hot summer sun, dug about the roots, mulched with coarse manure, and to pay me for this trouble the bark on one-half of the tree began to turn black before September, and at the time the leaves were off, the bark on the body of the tree had turned black and apparently dead. I expected, of course, the tree had "gone up," but I see this spring that the top of the tree is alive, the buds are green, and it seems now as if the tree would blossom and leave out as liberally as it did last spring. If your Club can tell me how I can save that tree I would like to hear the *modus operandi* of doing it.

Wm. S. Carpenter.—The disease here spoken of is a very common one, and is called the "frozen sap blight." It is very common in western New York nurseries, and is one of the causes of the high prices of trees, the proprietors lose so many of their trees. Some years ago the pear trees in Westchester county were very much affected, and some large old trees were lost. Sometimes only one side is injured, and the tree lives; but where young trees are dead half around the hole, it is best to dig them up and replant, as they are not likely to make healthy trees, and no remedy has been discovered.

The Black Knot.

I should like to hear some experience in relation to the black knot in cherry trees. It was stated last year at one of our meetings, by a gentleman whom I have relied upon as authority, that when there was no fruit for the curculio to deposit eggs in, they were inserted in the green bark, and that produced the black knot which disfigures and destroys so many trees. Recently the same authority tells us that the question is unsettled. Now, after I have argued a year upon this foundation, I dislike to have it knocked from under me. If the curculio does not make the black knot, what does? And what is the remedy? I have always recommended trimming off all these excrescences as a very healthy operation for the tree. Now we are told that it does no good to cut off the knots in the spring, for then the insect, whatever it is that had its home there, has escaped; so to do any good we must cut the limb off as soon as the puncture is made. I don't agree with this; I think that the knots poison the tree, and if cut away it may recover, and if left the tree will continue to decay and die. I always find that the wood near the knots is in unhealthy condition, and I think that cutting them off at any season is beneficial.

Mr. Carpenter said that the best time to cut black knots was in summer, but he agreed with Mr. Bergen that it will always be found beneficial to trees to cut them away, either as soon as formed or at some other time. He said: I have given up trying to grow plums after planting and losing a hundred trees. The curculio destroyed all the fruit, and the black knot

all the trees. Trimming would not save them. It is not worth my while to try to grow plums while I am so much more successful with apples and pears.

Mr. John G. Bergen.—I have looked into this subject; it has attracted my attention for the past twenty-five years. Some kinds of plums are very much less liable to be affected by black knot and curculio than others. There is one common sort on Long Island, called horse plum, that is most affected by black knot. The Damson plum is also badly affected. The Orleans plum has seldom been affected by the black knot, but the curculio destroys nearly all the fruit. Then there is the Catharine, and one called with us the blue gage, the fruit of which is small and abundant, though not first quality, which is seldom affected in fruit or tree. Of cherries, the common sour kind were the first destroyed by the black knot; next the May Duke, and now all sorts more or less. Some white cherries are the least attacked of any but the native varieties. The curculio, whether they cause black knot and then kill the trees, or whether it is some other cause, are certainly very troublesome insects, yet I am not disposed to abandon the attempt to grow plums and cherries, particularly the latter.

When your trees are affected by the black knot you must cut until you come to sound wood; if you do not you will lose the limb and perhaps the tree.

Solon Robinson.—I am as badly plagued with another insect as with curculio. Indeed, they are worse upon cherries; and last summer they destroyed bushels of my strawberry apples, taking nearly all of the earliest. I allude to the rose-bugs, those shield shaped, dirty-yellow colored pests of the rose bushes, ever since I can remember; but it is only of late years that they have become pests of the orchard and vineyard. If any one can give a remedy for this pest he will confer a great benefit upon community.

John G. Bergen.—I cannot name a remedy, but can state that the bugs may suddenly cease their mischief. A few years ago the south side of Long Island was so infested with them that no one could grow grapes; they cut off all the buds. For the last two years there have been very few of those bugs, not enough to destroy the grapes; and I never knew that they would eat cherries and apples.

Wm. S. Carpenter.—A neighbor of mine in Westchester county hired the children to catch these pests, and got rid of them in that way. I recommend that course. They are easily jarred from the trees.

Solon Robinson.—Like the recommendation to jar off the curculio and pinch his head, it may do on a small scale, but as a general thing it is impracticable. You could not jar them from my trees unless you jarred the fruit with them. I have seen a dozen upon one cherry, and they eat it to the stone. And I have seen them entirely burrowed in apples; and if they could be jarred from the tree, upon a sheet, it would require a good sized crushing engine to destroy them.

Winter-killed Evergreens.

Mr. Wm. S. Carpenter.—There has been a large loss of evergreens in this vicinity the past winter, both in nurseries and upon gentlemen's places. I have lost a number of trees in a hedge of arborvitæs, five years old.

Solon Robinson said that about one-fourth of his arborvitæs have perished, which at first he attributed to the effect of drought soon after they were planted last spring, but has since modified his opinion, upon finding so many fellow-sufferers. At Bridgeport, Conn., he saw last week a much larger per cent. of most carefully tended hardy evergreens in a dying condition. The proprietor attributed the loss to the long continued coating of ice on the trees and on the ground.

Strawberries—When to Plant.

Mr. Carpenter said it was very desirable to know that strawberries may be planted even after they have blossomed. This is the season to make strawberry beds. I think they can be planted for several weeks yet, or at any time before they send out runners.

Rev. Mr. Weaver, of Fordham.—Is it better to transplant strawberries now than in the fall? I have prepared a bed by very deep trenching; first, through a foot of mold, then a foot of yellow clay, and then one or two feet deeper, to break a hard pan below, which I thought necessary to make a good job. Shall I manure the bed, and what with?

Mr. Carpenter.—If set in spring, you will be sure of a good crop next season, but not so when planted in autumn. The ground Mr. Weaver speaks of is certainly well prepared, though too expensively for a large plantation. I would not use unfermented manure, but would use compost. I apply wood ashes, plaster, and some salt. In ground prepared like that spoken of, manure is less needed, for the roots will penetrate two feet deep.

John G. Bergen.—There may be places where it will pay to prepare strawberry plats three feet deep—it will not on such land as I cultivate on Long Island. There, if the soil is well prepared one foot deep, it is all-sufficient; and, as a general rule, the expensive sort of preparation recommended will deter people from cultivating this fruit. They will say it is too expensive.

Mr. Carpenter.—The soil of Long Island is very sandy and well drained; it is not necessary to trench land there, but in some locations where the land is heavy, I find trenching very advantageous. I have seen the roots of strawberry plants two feet deep; the land had been trenched and manured.

Prof. Nash.—The best manure for strawberries is swamp muck and woods mold; and the best soil is sandy, if muck can be added. It attracts moisture, and renders the soil more retentive. Trenching may do in some places, but it is a great mistake to recommend it for all. It would not do on the prairies, where land is cheap and labor dear; while here, where land is worth $300 an acre, and crops in proportion, expensive preparation of the soil will pay for such market crops as are usually cultivated near large cities. A great deal of our land is not plowed over three inches; when we say two feet I think we go to extremes.

Mr. A. S. Fuller.—Yes; and so will expensive manuring. As a general thing, farmers don't use half manure enough. Manure will pay for using anywhere, at its usual cost. I believe that I can use $200 worth of manure upon an acre of strawberries, and make it pay. But, as a general thing, I do not

recommend high manuring, because it requires a peculiar mode of cultivation, which but few will practice. It requires a renewal of beds every year. After the crop is gathered, the highly manured ones will grow very luxuriantly, and make a heavy crop of foliage to plow under in September, when new plants are to be set for the next crop. Thus a large crop may be grown at less labor and cost, and as much got from one acre as is usually got from four. In New Jersey strawberries are generally grown without manure, at the rate of about twenty-five bushels an acre. If land is highly manured, and the strawberry vines allowed to run year after year, it will become a nest of weeds and grass, and produce but little fruit.

Rev. Mr. Weaver.—If you have hard pan you must go below that.

Mr. John G. Bergen.—It is one thing to talk about high manuring near cities, but quite another thing to tell how to do it in the country. Everything must be adapted to the locality. I use $50 an acre worth of manure, and it pays; and I know market gardeners who use $100 worth per acre, and it pays, but it won't pay everywhere and upon all crops.

Prof. Nash.—No, it won't pay to use $30 worth of manure upon an acre of wheat that would not sell for that amount, as many acres do not; but it will pay to manure any crop so as to grow it up to a certain point, at which it is more profitable than above or below. It usually costs as much labor to grow twenty bushels of corn upon an acre without manure, as it would sixty bushels with manure. I have not so much experience in the advantage of manuring strawberries as I have corn. With that I have proved that $10 worth of manure brought $30 less value of corn than the same land and labor with $40 worth, and although the manure was but barely paid for by the corn crop, it was doubly paid for in succeeding crops.

Mr. Carpenter.—A neighbor of mine has been experimenting with manures; he begun at a cost of $5 per acre, and has now got up to $50 per acre, and he says this pays him a good per centage. I think I can get as much corn off three acres as many of my neighbors get off ten acres.

Mr. Fuller.—Our farmers do not manure half enough; the great error is in cultivating too much land. Put the manure and labor you intend for one hundred acres on twenty-five acres, and you will find it pays better than by cultivating the whole.

John G. Bergen.—I have grown the Scotch runner or Crimson Cone strawberry, by measure, at the rate of 500 bushels per acre, by high cultivation, but I doubt the profit of trying to make such big crops. I doubt whether it has been demonstrated that very high culture will pay upon strawberries.

Mr. Fuller said that he had grown at the rate of 600 bushels per acre on a small plot of the Bartlett strawberry, and by the same mode of treatment 400 bushels of Triomphe de Gand. The best treatment I have ever given strawberries, when grown in hills, was to stir the surface a little every day. Some varieties grow best in stools; the Wilson, for instance, and others, do best when they all run together. I have great faith in lightly stirring the soil among strawberry plants. The best Delaware grape vines I ever grew I produced by stirring the soil regularly every Saturday evening with a rake, and I believe it would pay to rake the ground among the strawberry plants every day, and cut off all the runners. I can grow

strawberries by this process upon poor soil, without manure. I am satisfied that surface soil stirring is the most important of all modes of cultivation. But in a strawberry bed you must be careful not to dig deep.

There is no process that can be applied to the cultivation of cabbage and cauliflower equal to stirring the surface every day.

Mr. Carpenter.—I fully agree with Mr. Fuller. I have found great advantages by constantly stirring the soil.

Adjourned.

JOHN W. CHAMBERS, *Secretary.*

May 12, 1862.

Prof. J. A. Nash in the chair.

Benefits of Birds to Farmers.

Wm. S. Carpenter said that he wished to call the attention of farmers at this time to the subject of birds and their benefits, particularly swallows, which, as a general thing, have been driven from barns because those of modern date are built so tight that the birds cannot get inside to build their nests. Sometimes they are allowed a sort of precarious chance under the eaves, but they do not multiply as they did in olden time when allowed free access to the interior.

It is stated that a swallow devours several hundred insects a day, which are its sole food, and if so they ought to be encouraged by all farmers.

Alpha Brown, Eaton, Madison county, sends the following communication, dated May 1, 1862:

"I notice the Farmers' Club frequently discusses insect-destroying birds; but there is one I consider worth to the farmer a half dozen of others that are held in high repute. I mean the crow. When a boy I was kept with gun in hand to watch the corn field and keep the crows off, and have killed more than any man ought to before learning their habits. First, if crows can get worms or soft food of meat kind, they will not eat grain; but if hunger compels they will eat corn, young turkeys, and lambs' eyes, and take goslins, or anything to keep from starving. For twenty years I have kept them from pulling corn, simply by feeding them corn sown broadcast on my corn field; just enough, so there is feed at all times. Last year I planted two acres, and drilled in one for fodder. It was sward ground, where the worms had destroyed the grass, and the gray worms were so thick we frequently hauled out five or six in a hoeful of dirt, and my men said the worms would eat up the corn. As soon as we harrowed, and the soil was opened, a few crows came one night to pick up worms, and I kept them undisturbed, sowing a pint of corn every few days to keep them in food, and by the time the corn was up they had exterminated the worms so they cut but few spears of corn.

"I think they destroy more worms than any bird we have; I have watched them for over forty years to learn their habits, and for over twenty years have never been troubled with their pulling corn, and my experience has led me to this conclusion: if the crows can find worms enough to eat they will not eat corn, and if short of food they will not pull corn if they find it

on the surface. I have fed about fifty through March on deacon calves, or what you call Bobs, and they have been busy since snow went off picking worms out of my meadow. I suppose you are aware that the gray worm lays in the roots of the grass at the surface, in the spring, when the snow goes off.

"Another subject I will mention is gapes in chickens. We have lost most of our early chickens with gapes, and I have opened a good many after they died, and took out the worms, and I think I recognized at once the angle worm, such as I had seen by thousands in moist weather in May and June in the dirt about my buildings, from the size of a hair to the size of a pin, white, and from three-quarters to one and a half inches long. I took out nine from one that lived three weeks after taken, last season, that were two and a half inches long, and showed plainly what they were. They had filled the pipe completely full, all lying straight, side by side. Those having an interest in the subject will examine further and apply the remedy, which is to put the chickens on a floor strewed with sand and lime, or ashes.

"Early chickens won't pay here if not troubled with gapes, as chickens coming out in July will grow in half the time, and are not troubled with worms, as it is then dry and the worms have left the surface for moisture below. Perhaps you will get my ideas, and it may set one a thinking, and you might ask of any one if they ever knew a crow to give their reasons for doing it."

The Chairman.—There is another benefit of crows to farmers; they drive the small birds from the forest to seek shelter near our dwellings.

Mr. Carpenter.—I prevent crows from pulling up my corn by stringing white twine across the fields, but it must be put up before the crows get in the way of coming into the field.

Mr. John G. Bergen.—I have found all sorts of scarecrows ineffectual, but tarring corn would prevent crows from pulling it. It is easily done by dissolving a pint of tar in warm water enough to cover a bushel of seed corn, stir it until every grain is covered, then add ashes until the corn is separated. I have never been troubled when I use tar.

Prof. Nash.—If the crows won't eat the dry corn sown for them on the surface, as some farmers allege, I would recommend planting a row very shallow between the permanent rows, so that it would vegetate and be eaten by the birds, so that they would not touch the other.

Edwin Goodell, Birmingham, Michigan, writes to one of the members asking information:

"I am always much interested in the discussions of the American Institute Farmers' Club, but there are many topics you do not, as I observe, touch upon.

"I am ignorant as to the culture of many garden vegetables. For instance, I have just received celery seed from the Patent Office; also asparagus and salsify, but do not know how to treat them.

"I wish your time would allow you to write a work on the kitchen garden, in the luminous style of 'Strawberry Culture.'

"What is the best work on grape culture? I have several varieties from the Patent Office, viz., Isabella, Catawba, Rebecca and Diana.

"Grapes do well here, and if I were to get a few vines additional to the above, what kind or kinds shall I purchase?

"I noticed a recipe of yours, reported in the proceedings of the Club, for curing hams, and upon trial we find it excellent.

"Now, is there a way to corn beef so that it shall keep sweet through the summer without salting it so as to render it tough and unpalatable? I have always cured it like hams. It is tender and good but will not keep long in warm weather without scalding the brine, and this seems to injure the meat.

"What is the best plant for a reliable hedge fence? And where stone is not to be had, and timber is getting scarce, would you advise an attempt at such a fence?

"One more inquiry and I will try your patience no longer. Would you recommend planting a small orchard of dwarf pears for market purposes, thinking that with proper culture they might prove a profitable investment?

"I am commencing farming on a worn out but naturally first rate soil, twenty miles northwest of Detroit, Michigan, much in debt, and many a time would give my last dollar for the opinion of a man who knows whereof he affirms."

Mr. Lawton answered that Buist's Kitchen Gardener is a good work for such a man, and so is a small book published by Fowler & Wells.

Mr. Pardee said: I have sent him Dr. Grant's catalogue as the best work on grapes, and I also recommend him to plant standard pears. About beef-curing, I think that the receipt mentioned will do it by adding more salt, and, perhaps, more sugar.

Solon Robinson.—Evidently this gentleman has not read all the proceedings of the Club, or else he would not ask what grapes to plant. That question was most fully answered a few weeks since. As to a hedge plant I cannot recommend a single one.

The best remedy is to dispense with fences and keep the cattle out of the highways.

The New Law about Stock on the Highways.

The allusion to cattle on the highways elicited a spirited discussion upon the new law of the State of New York, which absolutely prohibits stock running upon the highways, and authorizes every man to shut up any animal found at large, and give notice to a justice of the peace or commissioner of roads, who will assess a penalty, and order the animal sold if not redeemed. This law was highly approved by all but one man from New Jersey, who denounced it as an act of oppression to the poor man, and that sort of *ad captandem* argument always resorted to by the advocates of universal liberty to cattle, hogs, geese and goats.

Solon Robinson.—It would be far better for all who own land to pay the expense of keeping a cow for every poor man in the community, than to allow them to run in the highway; and as to the argument that a poor man has a right to feed his cow upon the grass that grows upon the roadside, that is not so, for no man has any more right to the grass on the outside of my fence than he has to that on the inside. The public have the right of

way along the road, and that is all. Cattle in the roads, and particularly along railroads, are a great nuisance, and I rejoice that the new statute has settled that point in this State.

Obstructing Roads.

Mr. Carpenter called attention to a reprehensible practice that prevails in some parts of Westchester county by owners of land placing logs along the sides of highways, so as to confine the travel to a narrow space along the center. Others plant trees so that they obstruct the right of way on narrow roads.

The Chairman said it would be more sensible to require landowners to keep the road sides properly dressed in grass, and allow nothing else to grow, and have no obstructions in the highway—the worst of which is cattle; and I am glad that New York State has taken a step to get rid of the nuisance. A similar law has been of the greatest advantage to Massachusetts.

Insects Found in Dry Grain.

Solon Robinson read the following letter from D. W. Brannan, dated Wadham's Mills, May 3, 1862:

"Inclosed I send you a quantity of live stock. These animals were captured by W. L. Wadhams, a manufacturer of flour, in this place. He discovered them a few days ago in his smut mill. Our wheat last season was covered with lice. Can these be the offspring of those flies or lice? Who can tell? What may we expect from them the coming season? If your learned and scientific men want a supply, Mr. Wadhams can furnish them by the bushel. I am of opinion that those lice deposited the nit of these."

These specimens were examined by several members, none of whom could give any satisfactory information, but looked upon them as a new pest of the farmer.

Cultivation of Celery.

Mr. Carpenter said that he had found it absolutely necessary in sowing the seed to do it in a shady spot, else the plants were liable to dry up and die before they attain any size. The ground should also be kept moist. When the plants get large enough to prick out, I set them in rows two or three inches apart to grow until large enough to set where they are to stand. Some of the most successful cultivators do not set celery in trenches, but on a level, with room enough between the rows to haul up dirt around the stalks. It is asserted by those who have tried both ways, that this mode requires less manure, and that the early growth of the plants is better, because the surface is more fertile than the bottom of a trench.

Barren Grape Vines.

C. L. Foster, Topsham, Vt.—In looking over the report of the "American Institute Farmers' Club," I noticed a mention of "a barren grape vine," by "A. Lester," and a different remedy than the one recommended suggested

itself to my mind. Many species of the grape are "diæcious," *i. e.*, having staminate and pistilate flowers on different plants. Perhaps the one spoken of by A. Lester may be staminate, and require one which is pistilate to be planted near it, or *vice versa*, instead of a change of soil.

The question then arose whether there was any such thing as a "flowering grape vine," that would not bear fruit.

Dr. Church, of this city, stated that he had a vine that flowered regularly every spring for several years, and produced no fruit; but he did not think it was because the blossoms were either pistilate or staminate, and needed a vine of an opposite sort to fructify them.

Mr. Carpenter said that was the case with raspberries, particularly with the Allen variety.

Mr. R. G. Pardee.—Is there any proof that any grape vine is permanently barren? I have known vines barren for years, which, by a new kind of treatment, became fruitful, with no other change of circumstances. Vines of this sort are often made to produce by pruning and fertilizing.

Culture of Indian Corn.

The Chairman asked whether hilling or flat culture was preferable.

Mr. John G. Bergen.—Although I am not in favor of hilling corn by hand, yet, as a general thing, whoever tries to raise corn entirely upon the system of flat culture will find the increase of expense too much to pay. It all depends upon soil and situation. Adaptation to circumstances must be the governing principle. It is one of the faults of the discussions of this Club that members are too apt to lay down rules suited to the circumstances of the speaker. Some land absolutely requires a different mode of culture from others. Many English farmers fail in this country because they attempt to follow rules only suited to the moist climate of England.

Dr. D. P. Holton.—Economy in the culture of the ground is to be attained in following a triple series:

1. The construction of instruments in conformity to nature's laws and to the ends derived.
2. Publication of these inventions to secure their practical adoption.
3. The right use of these instruments with due regard to the soil and its products, climate and surroundings.

The American Institute has from its origin regularly pursued this series:

1st. It pursues the first in welcoming and encouraging the presentation of new instruments, or modifications of those in use.

Here theories and principles are discussed and skillfully applied, whether to sustain the hopes of the inventor or to instruct him wherein his invention is formed on a basis of error.

It is often more difficult to dissipate an erroneous basis than to reconstruct a truthful one. Here many an inventor has had occasion to appreciate the proverb: "Faithful are the wounds of a friend;" and again the encomiums and prizes of the Institute have judiciously stimulated true genius.

2d. The American Institute pursues the second of the series in its weekly reunion of practical farmers and men of science for public discussions, in its annual fairs and in its Transactions, widely circulated through the press.

Thus inventive genius is making sure steps of progress throughout the world. These and similar discussions, exhibitions and publications are rapidly opening new sources of wealth and comfort, arousing the most stupid to see and confess these progressive economies.

3d. In the triple classification of means for attaining to the true economy in cultivating the ground, the American Institute endeavors to encourage the right use of these inventions with due regard to the soil and its products, climate and surroundings.

This is in part attained by encouraging a spirit of emulation in exhibiting the best products in competition. But the Institute has not yet been able to furnish that best of means, a model and experimental farm, for the solution of high questions of agriculture and horticulture, in a locality easily accessible to great masses of people, citizens and strangers—a school for the most economical training of good farmers.

American farming will continue to be the ruling interest at home, and the spring of our greatest power abroad.

In this view it becomes very important that inventions continue to be encouraged, and that near the great centers of population and travel a grand experimental farm should be established by Government for the solution of great questions of agriculture, the acclimation of plants and animals from foreign parts, for the practical test of instruments invented for surface culture, where multitudes of citizens and strangers may see the practical workings of science.

In connection with this experimental farm there should be a school of agriculture and horticulture, where the lectures may be open for the free entrance of the masses, though specially appropriate to the regular instruction of the youth, thus preparing to go forth as practical farmers, well instructed in the organic laws of plants and animals, in the physical sciences, and thoroughly trained in the use of the various instruments for the culture of the earth.

Let this experimental farm be the special home of the orphans of our patriot soldiers, and our General and State Governments will find it both constitutional and expedient to liberally endow it, and secure to the school a perpetuity of efficient action and usefulness.

Subject for the next meeting, "Profits of Keeping Poultry."

Adjourned. JOHN W. CHAMBERS, *Secretary.*

May 19, 1862.

Mr. Nathaniel Hawxhurst in the chair.

What is Sold for Gypsum.

Rev. Mr. Weaver, of Fordham.—Here is a sample of something that is sold in this city for ground plaster, at $1.00 a barrel, which the seller sent me upon an order for plaster, and now says it is better than that for agricultural purposes, but don't say what it is. That I should like to know.

Dr. Church, of New York.—I judge, from appearances, that this is the residuum of a manufactory of muriatic acid, which is made by putting com-

mon salt (muriate of soda) and sulphuric acid in a large iron retort, lined with clay bricks, where it is raised to a very high heat, and the vapor passed over into a condenser, and the residuum is principally sulphate of soda (Glauber salts) and not sulphate of lime, which is commonly called plaster of Paris. It may be a very good manurial substance, but it should not be sold as sulphate of lime, the action of which is well known upon plants. This substance usually sells at $8 and $10 per ton, and higher than plaster. Perhaps this is adulterated. I should judge by the price that it was so.

Prof. Nash.—I have just tried this substance, and find that it is nearly all soluble in cold water, which proves that it is not plaster, which is so insoluble that 100 pounds per acre is as good as more, because that is as much as all the rain of one year would render soluble. I should think that this substance was principally composed of a sort of impure Glauber salts, which is a good fertilizer.

Dr. Church.—Yes, and so is common salt, and also sal soda, which may be used advantageously, 500 or 600 pounds per acre. In answer to the question, whether it is as good as plaster as a deodorizer, I should say not, nor as good as a solution of common salt. As to the solubility of plaster, the rule is that it requires 750 times the weight in water of the plaster to be dissolved; but in practice it is better to say that one pound of plaster will require 1,000 pounds of water.

Scalding Onion Seed.

Solon Robinson read an extract from a western agricultural periodical in relation to scalding onion seed, from which we abstract the following:

"The seed is placed in a saucer and boiling water is poured over the seed, when little sprouts, as large as horse hairs, were shooting out of the opened ends of the seeds. The water did not remain on the seeds over three seconds. It is said that this process advances the growth of the onion two or three weeks beyond the ordinary method of planting."

Prof. Nash.—In pouring boiling water upon trees to kill grubs, would you make a basin of earth around the base of the tree and fill that with hot water?

Solon Robinson.—No, I would pour the water from the spout of a tea-kettle directly upon the tree, near where the grubs were, and the steam will cook them but won't injure the bark.

Cost of Growing Sorghum.

S. Ward, of Lane, Illinois, gives the following as a correct statement of the cost of raising and manufacturing one acre of sorghum according to his experience:

Use of one acre land	$3 00
Plowing	1 00
Dragging and marking out	50
Seed	50
Planting	1 00
Cultivating	1 00
Hoeing	1 00
Stripping	4 00
Cutting and topping	2 00

Drawing to mill	$4 00
Two hands and one horse four days, making syrup	10 00
Fuel	8 00
Use of mill	4 00
Total	$40 00
Cr.—By 160 gallons syrup at 40c	$64 00
Cost	40 00
Profit per acre	$24 00

Or 160 gallons syrup at 25 cents per gallon.

If a farmer should get his syrup made on shares, the cost, according to the above account, of raising and drawing to the mill, if near by, would be $18.

Receives 80 gallons syrup	$32 00
Cost	18 00
Profit per acre	$14 00

Or 80 gallons syrup costing $22\frac{1}{2}$ cents per gallon.

Prof. Nash.—This statement looks fair, except the sum for the use of the land.

Solon Robinson.—That is worth what it will bring in market, and the sum named is above what you can rent millions of acres of land at on the prairies of Illinois. But here is another statement, made by Ransom Bartle, of Independence, Iowa, where the use of land is stated much higher—too high.

PROFITS OF SORGHUM CONTRASTED WITH CORN AND WHEAT.

Corn.	*Cr.*	
500 bushels	$100 00	
Stalks	10 00	
		$110 00
Corn.	*Dr.*	
Use of land	$20 00	
Plowing same	10 00	
Marking and planting	5 00	
Seed for same	1 00	
Tending same	15 00	
Harvesting same	25 00	
Marketing same	25 00	
		101 00
Profits on ten acres		$9 00
Wheat.	*Cr.*	
170 bushels wheat, 55 cents	$93 50	
Straw	6 50	
		$100 00
Wheat.	*Dr.*	
Use of land	$20 00	
Plowing same	10 00	
Seed	10 00	
Seeding and harrowing	5 00	
Cutting	5 00	
Binding and shocking	7 00	
Drawing and stacking	4 00	
Threshing	17 00	
Marketing	8 00	
		36 00
Profits on wheat		$14 00

Sorghum.	*Cr.*	
2,000 gallons syrup, 40 cents	$800 00	
200 bushels seed for feed	30 00	
		$830 00

Sorghum.	*Dr.*	
Use of land	$20 00	
Plowing the same	10 00	
Seed	4 00	
Marking and planting	10 00	
Tending	20 00	
Harvesting	50 00	
Ten cords of wood	25 00	
Manufacturing	76 00	
Marketing	20 00	
Sixty barrels at $1.25 each	75 00	
Interest on mill, etc	15 00	
Wear and tear of machines	25 00	
		$350 00
Profits on sorghum		$480 00

Broom Corn.

Prof. Nash.—In the region of Northampton, Mass., broom corn has been grown for over half a century. I remember the time when $30 an acre rent was first offered for land near Amherst to raise broom corn, and it was thought a very extravagant price. I have since seen land rent for $100 an acre to grow tobacco. This, however, included a small supply of manure. I remember, too, that broom corn was a very profitable crop about Northampton, fifty years before the farmers not fifty miles off found it out, so little is known of the cultivation of one town in one adjoining. Farmers are excessively cautious about adopting any new crop, or new mode of farming.

Locusts—How they Affect Fruit.

The Chairman stated that a person who has the records of a cider mill in New Jersey for ninety years, assures him that the seventeen-year locusts have more effect upon fruit trees than is generally ascribed to them. He says that it is fully proved that apples are more abundant for seven or eight or nine years after the locusts appear, than they are in the seven or eight years previous to their appearance.

Dr. Trimble.—This is an interesting fact, and is easily accounted for. The locusts in their perfect state, like butterflies of destructive caterpillars, eat nothing. They come out of the ground to deposit their eggs, which they do in the bark of fruit trees in preference to any other. These eggs hatch perfectly-formed locusts, of extremely diminutive size, drop to the earth immediately, and burrow in its crevices, and attach themselves to the roots of trees, and undergo their slow growth in the earth, and of course suck the juices of the tree from the roots and injure its vigor, so that towards the end of the seventeen years it does not produce as much fruit as when the insects are very minute. When they come out of the earth they are full-grown and fat, and eat nothing above ground, and only injure trees by perforating the limbs to deposit eggs. By this the limbs of some slow-growing oaks are killed.

The regular subject of the day, "Profits of Keeping Poultry," was then taken up.

Mr. Robinson.—Mr. S. C. Kenard, of South Newmarket, N. H., sends us the following statement: On the 12th of December I bought twelve hens, paying therefor $3. I went to work and made a coop, four by eight feet, and six feet high, with slats on the larger portion of the side facing the sun, the other portion being closed to protect the fowls from the storms, when they chose to occupy it. At the closed end I attached a box on the outside, four feet by one and a half, and one and a half feet deep, and connected to the main coop by holes of sufficient size to allow the fowls to enter the box to deposit their eggs, the box being furnished with straw and kept clean and dry, and having a lid to open, which I found very convenient, as there was no necessity of entering the coop for the eggs. A box was arranged for feed, which was always kept supplied with corn, and this, with a supply of clean water, and an occasional feeding of refuse meat or offal, and a supply of pounded oyster shells, constituted their feed. At the end of the year I footed up the account, and found my twelve hens had eaten just twelve bushels of corn, which had cost me $9.60, which, added to cost of fowls ($3), made $12.60.

The credit footed up thus: Eighty-five and a half dozen eggs, at the weekly market price, and that, too, in a country village..................$14 40
By eleven hens (one having died during the year), at twenty-five cts. 2 75

Total....................................$17 15
which gave me a profit of.................................... 4 55

So much for my first year's experiment.

The second year I continued the same treatment as the first, with the single exception of feeding a small allowance of chopped grass and weeds, which I found an improvement; but, to please the children, consented to try the experiment of raising poultry, keeping a strict account of debt and credit as before. But I found at the end of the year that the poultry-raising had turned the balance to the other side of the sheet to the amount of $2.35.

The third year I pursued the same course as the first, and my twelve hens gave a profit of $5.16.

Now, suppose your lady inquirer could keep twelve hundred hens (which she could easily attend to), her income, according to my experiment No. 1, would be..$455
Or, according to experiment No. 3.................................. 516

She can judge whether it would be remunerative.

Again, my experiment was made in a country village, where the price of eggs is probably less than in the cities—say one or two cents per dozen, while the price of corn here is usually from twelve to fifteen cents per bushel higher than at New York. It is now (April 21) seventy-five cents per bushel.

In conclusion let me add, that the surest way of knowing is to try the experiment yourself.

A word more to your inquirer: Don't meddle with "golden plumage"

"Shanghaes," or any other of the thousand-and-one humbugs of fancy breeders. Get the old-fashioned, common, medium-sized fowls, and when you have made a satisfactory experiment let us hear the result.

The Chairman.—I think poultry-keeping is like strawberry-growing. Twelve hens may be profitable, but twelve hundred would not be, nor fifty either. I have often grown strawberries at the rate of four hundred bushels per acre, but I never grew one hundred bushels upon one acre.

Solon Robinson.—A friend told me to-day that seven hens produced this spring one hundred and twenty-six chickens; one hundred and twenty-five of them are now alive and healthy. Last year eleven hens hatched one hundred and ninety-two eggs and raised one hundred and eighty-six chickens, the others being destroyed by the crows.

Rev. Mr. Weaver.—I have known three hens to raise one hundred and fifty chickens, though not all of them of their own hatching. Such hens were profitable.

Gapes in Chickens.

Rev. Mr. Weaver.—As the subject of raising poultry is under discussion, I would say that I never find any trouble about curing the gapes by the horse-hair remedy—a horse-hair formed into a bow and inserted in the windpipe of a chicken, and twisted about to loosen the worms. I never have been troubled with this disease; I allow the chickens to remain two or three days in the nest, feeding them with hard-boiled eggs, and then never allow them on the damp or cold ground. Many chickens are killed by lice. The remedy for that complaint is grease. The main thing in poultry-raising is to keep your chickens dry, warm and clean, and well fed.

"Surface Culture and Profits of Raising Poultry" was continued as the subject of the next meeting.

Adjourned. JOHN W. CHAMBERS, *Secretary.*

May 26, 1862.

Mr. Edward Doughty, of Newark, N. J., in the chair.

Mr. Robinson read a letter from Henry C. Wright, Pekin, N. Y., showing what Paulina Roberts and her family of daughters have done on the farm during the past year, from which we extract the following:

"Their spring work was begun on the 19th of April, since which time four of the daughters, aged respectively 19, 15, 13 and 11, assisted by a niece aged 17, and by their mother, have accomplished the following labor, *i. e.:* Plowed 75 acres; dragged 100 acres three times over; sowed broadcast 100, and rolled 100. More plowing has been done, but above amount of labor has been done exclusively by the mother and the young daughters. They have now growing 45 acres of wheat, 15 of winter and 30 of spring; 50 acres of oats; 30 acres of flax, and are to put in 10 acres of corn; 10 of beans; three of carrots; three-quarters of an acre of onions, and 10 acres of potatoes.

"To-day I saw one of the daughters plowing, aged 13, holding the plow and driving her own team. During the day she plowed one acre and a

half, and this is the usual labor of the day in plowing. Last Saturday I saw two of the young girls, one aged 17, the other 15, sowing wheat broadcast, and their sowing was done as well as any one would do it. I saw another, aged 13, *dragging*, and another, aged 19, *rolling*, and another piling and burning brush with her father. These daughters have each the care of their own teams. One of the daughters, who is 17, is detailed to do the housework this season. She is good at plowing, sowing, dragging and rolling as any of them. The housework is considered by them the hardest and most difficult to perform. They all prefer the out-door farm work.

"During the two years they have been on this farm they have labored mainly to get the land in a state to raise good crops. They have succeeded. They have spent $1,400 the past year in draining. This work has been done by men. During the two years over fifty acres have been cleared of bushes, stumps and roots, and this has been done mainly by the mother and daughters.

"Mrs. Roberts and her daughters, as I have stated above, have put in thirty acres of flax. They reasonably expect a ton and a half per acre. There is an establishment in Lockport, ten miles from their farm by railroad, to convert flax into cotton. The company offer them $8 per ton in advance for all the flax they can raise, and they are offered $1 per bushel for the seed. If the company in Lockport succeed in their efforts to cottonize flax, as it is confidently believed they will, untold quantities of flax will be produced in this region. It is a pretty sure crop, seldom failing, as does wheat."

Mr. Carpenter.—The effort of Mrs. Roberts and her family was very meritorious, although he thought that in this enlightened age it was not the place for women to do this kind of work. He understood, however, that a woman in his neighborhood had taken a farm of seventy acres, which had been so run down that the former occupant could not make a living upon it. Her intention is to educate young girls to the labor and duties of farmers' wives, and to raise small fruits for market.

Prof. Renwick.—I am old enough to remember when it was common in this part of the country for women to work out a portion of the time, and their general health was much better than it is now. In Europe, where women work out very commonly, they are robust and healthier than American women in the same ranks of life. Some women think it is a degradation to do any out-door work, even so much as to trim a rose bush. I noticed, on a visit to a great dairy region in Herkimer county, N. Y., that nearly all the labor of the dairy was done by Irish hired men. In Cheshire, England, I never saw a man do anything of the sort. I do not understand what has produced the existing notion among American women that out-door labor is not as respectable as any employment in-doors. I am sure it is equally honorable and far healthier.

Mr. Robinson.—With me there is no question whether it is not more respectable for the daughters of Mrs. Roberts to go into the field and labor than it would be to idly spend their time in the house, living upon the toil of their parents.

Prof. Nash.—It is not uncommon in England and Scotland for women to take charge of a farm and conduct it successfully. In England, women

take pride in a knowledge of agricultural matters, and attend meetings and shows, and are respected highly, for their influence is very beneficial.

I have, however, not come to the conclusion that this is the best way to employ females.

There is work upon a farm that women can do, such as making butter and cheese, raising poultry, &c.

I think it very meritorious when women can take charge of a farm, in case of the death of the husband; but, as a general thing, our women are opposed to anything that relates to the labor of the farm.

Curculio Remedies.

Mr. Carpenter.—I understand that Mr. Henry Cox, of Manhasset, L. I., has raised several crops of plums by pursuing the following method. Before the fruit has set he makes a trench around the tree, cements its sides and bottom, and keeps it filled with water.

Mr. Pardee.—This plan I know was tried at Palmyra, N. Y., and failed.

Dr. Trimble.—The curculio is a flying insect. I cannot see the use of encircling the tree with water. These pests are now at work upon the pears; I caught a bottle full yesterday.

Mr. John G. Bergen.—Mr. Cox undoubtedly gets good crops of plums, whether the water keeps the curculio off or not.

The Curl in the Leaves of Peach Trees.

Mr. Peter G. Bergen, of Long Island, exhibited specimens of this disease, which is now very prevalent, and asked for the cause and a remedy.

Mr. John G. Bergen.—I am glad that Mr. Peter G. Bergen has introduced this subject, because his theory always has been that the disease was caused by cold easterly storms. Now, as we have had no such storms this spring, and the curl is as bad as ever, that theory must fail. With me the storm theory never was tenable, because the disease is a new one, that has only been very troublesome about twenty years, while easterly storms are considerably older, and I can remember when we used to have storms and peach crops the same year. Currant leaves curl too, sometimes, and upon them I have often observed a green insect, and I suspect that it is an insect that causes the peach curl, notwithstanding we are told that a large magnifying glass fails to discover any.

Mr. Solon Robinson.—I am of opinion that the leaves have been stung by some insect.

Protecting Fruit from Insects.

Mr. Carpenter.—I see on the table some ornamental wren houses. They are made by Mr. John H. Mead, in Ann street. I think we should encourage the raising of wrens; they are great insect consumers.

Mr. Robinson.—When I was a boy we used to make wren houses out of gourds. A cheap house is made by taking a piece of two inch drain tile, stop one end up with clay, and place them up in the trees. These boxes are very pretty, and would be more ornamental to a gentleman's place

than gourds. I have faith in birds as insect destroyers, but they cannot kill them all—they are too numerous.

Mr. R. G. Pardee.—The best remedy for insects is clean culture, though I would protect the birds and encourage them to build nests near the house. One good prevention of insects is to compost all manure, and keep everything that will make manure in the compost heap, and decompose that with lime and salt mixture, which also destroys weed seeds.

Strawberry Culture.

Solon Robinson read the following letter from Dr. Meeker, of southern Illinois, upon this important branch of agriculture:

"Cairo, *May* 14, 1862.

"Strawberries are very nice, and at this season of the year people eagerly listen to whatever is said about them, particularly if there is even a remote prospect of their getting any. Though they are mostly seen in cities, they are raised in the country; but country people seldom see them, and our farmers may be compared to the Spaniards of Old California, who had no idea that they lived in a land of gold. The longing of children and young persons, and even of men and women, for this fruit, is general. Some make journeys of miles in wagons or on foot, often to find scattering berries, or that they are all gone.

"A town of two thousand inhabitants will buy, annually, one hundred and fifty dollars worth of strawberries. There are, probably, 500 such towns in our country, and half as many towns much larger. There are thousands of farmers, who would supply the want of these towns with strawberries if they knew how to raise them. I am going to tell them how. Five years ago I set out an acre of strawberries, and for three years I could not get enough for my family. The public shall have the benefit of my experience at the cost of this paper, while the cost to me has been more than I am willing to tell. Wealth and refinement are the fruits of long labors, of many disappointments, even of broken hearts. Our present world has grown out of the wreck and ruin of a former world. Let every one hasten, before he too lie in ruins, to impart what will be useful to others—what, to obtain, cost him more than, when young, he thought himself worth.

"THE KINDS TO RAISE.

"For market purposes, and for distant shipments, no variety is equal to Wilson's Albany. For productiveness it far excels. It is sour, unless dead ripe, but people in cities have money and can buy sugar; besides, people who cannot tell scum from cream, are not likely to be particular, nor will they much care for anything but looks. Being sour, it is not easily hurt by frost; and for size, hardiness, or weight, it is celebrated. For family use, the Hooker is superior, and it is nearly equal to the Wilson for other qualities, but, for the first year it requires more care. Neither of these require any attention regarding sex. I doubt whether any berry, except the wild one, has the exquisite flavor of the Hooker. There are several new varieties, but, except for family use, I doubt whether they are equal to either of these. Fine fruit is almost always soft. Some varieties are earlier by a

few days, and only by a few days. During these few days one can eat a great many strawberries in anticipation, and they are very good this way.

"GARDEN CULTURE.

"A garden is supposed to be well plowed; but never mind whether it is or not. Take your spade and dig up the ground as deep as you can, where you would have your strawberries, and make it fine. Plant in the spring; but you can plant in June or July even, if you take great pains. For fear dry weather may follow planting, puddle the roots; that is, dip them in thick mud so as easily to make a lump or ball of moist earth around them. They will hardly grow when taken up with a solid lump around the roots. The way to take up the plants is to dig deep around them, bringing up all the roots you can; then, when you shake out all the dirt, then puddle them (they can be transported far this way); and if they are set out immediately the roots will swell out, and little fibers will start in a few hours. When set out in April or May, in latitudes north of forty degs., and if the ground is moist, little care is required; but if planted later, they should be put in holes, well watered, and covered with some litter to protect them from the sun.

"Plant in rows, three feet apart, and from one to two feet in the row. Let the rows be ridges a foot high, because, by this means they will not wash the soft dirt around them and smother them, and because in spring the water will settle in the furrows, and thence ascend to the roots, for no plant needs water more than the strawberry through the flowering and fruiting season. By this process you will have more and larger fruit than by the flat culture. I think the flat culture for any kind of fruit highly objectionable in many important points. During the summer you may hoe them as often as you please. They certainly should be hoed just after picking, never while in blossom or bearing fruit. The more you hoe during the summer, the more the weeds will grow, and this with increased rapidity as the season advances. If, however, the weeds should get a start of you, or should you become discouraged, do not think you will have no strawberries, but do this: when the weeds get ready to go to seed mow them down with a scythe, and late in the fall, perhaps very early in the spring, take a strong garden fork and slightly raise their roots. If you neglect this last direction you will not lose much. It is a good thing to put a little straw over them during the winter; it is, perhaps, important if you have hoed them clean, but where the weeds have been mowed, these afford sufficient protection.

"Having followed these directions, not in part, but wholly, you cannot fail to have a fine crop of strawberries. The plan now is, after picking, to thin them out to the original number, retaining the best plants, and thoroughly loosen the ground and start again with clean beds. Mind, now, I am speaking only of the Wilson and Hooker plants, though other varieties are treated in the same way, but I have nothing to say about them.

"If you should set out two hundred good plants you will have all your family can use, let it be ever so rich in numbers; if you set out five hundred plants you can give a good many to your neighbors; in which case you will have many visitors, some of whom you will be very glad to see; some of them you scarcely know, and some have let a long time pass since they called on you. If you have girls, their beaux will pay them additional

attention; if you have boys, you will be astonished to see how many girls they have taken a fancy to, or who have taken a fancy to them. You will find also there are very many sickly persons, far and near, on whose stomachs nothing will sit but strawberries. Besides all this, you will have become a gentleman and a man of taste; instead of hard stories being told about you, it will only be whispered that you are a little odd or cross now and then, and everybody will think you the finest man in the neighborhood.

"FIELD CULTURE.

"For a next year's crop, take a piece of your own land, for your own land will always do better than rented land, and during the summer plow it well once a month, and, if it is inclined to grass, harrow it thoroughly, so as to tear every sod to pieces. By plowing well I mean plow as if you would like to get down to the center of the earth; plow as if you were a soldier in battle, and determined to conquer barbarism and crown freedom. But I should say, if it is clover land, don't touch it; grass you can kill, clover you cannot, and it will come up and ruin your plants. Here, in southern Illinois, grass grows with reluctance, and I have seen a gentleman take a visitor over his lot to show him his grass, and occasionally both would be on their hands and knees. Sometimes they see it. This is the kind of land for strawberries, and it is superior also for any other kind of fruit Strawberries require a fair—I might say extra fair—soil. High land is better than low land, and hilly land is good. The very best is thin new land, or old worn out land well manured, with no clover seed in it. But let the soil be what it may, plow deep and often through the summer. A very good way to raise strawberries is after an extra crop of potatoes, which have been kept entirely clean through the summer and fall. All you will have to do with such ground will be to plow it up as early as you can in the spring.

"Suppose, now, everything is ready, commence by throwing the ground into ridges, from three to four feet apart—four feet will be better—and for this purpose I would take a yoke of cattle and the heaviest plow I had, get good plants, and set them on the ridges, eighteen inches apart. Usually, they will bear enough the first year—that is, two months after planting, to pay you for all your labor. After picking, run between the rows with a one-horse turning plow, throwing the dirt towards the plants. It will cover some of the runners, and all the better, for they will take root in the soft soil and grow finely. Plants set out in the spring are worth double what they would be set out in the fall; for they commence immediately to grow; they require no puddling or watering, and every one will grow. Set in the fall, many of them are heaved out by freezing and thawing, and, being in their weak state, they are subject to all the various changes of the unfavorable winter.

"As regards the treatment now to be pursued, there is a diversity of opinion. Those who are anxious to do great things, and who are determined to do them, will set the plants thickly, cut off all runners as often as twice a week, and hoe well through the summer and fall. They are going to show how to raise strawberries. Very good. One faithful man can keep an acre clean; he cannot do more, and his labor is worth a hun-

dred dollars. A quarter of an acre is as much as a single handed man, with other fruit to attend to, will be able to work; and even with only this amount, in nine times in ten, he will give up in despair before the season is through, and let the weeds grow. Having myself hoed them as much through the summer as my strength or patience would permit, and having neglected to hoe at all, I have to say, as the result of my experience, that hoeing does little or no good. Facts are what we want, not theories. I have over an acre of strawberries now, in full bearing, and entirely free of weeds, into which I did not take a hoe all last season. I will grant that by hoeing you may show a limited number of fine plants; but after all, I can show as great a number of as good plants, where I do not hoe, and beside, have thousands of second and third-rate plants which will yield in the aggregate many bushels. Where plants are thick it is impossible to hoe them. I come, then, to this conclusion, that I can raise as many strawberries without hoeing as I can with hoeing; if I wanted to boast, I would say double the number, and perhaps state nothing but the truth.

I have but to add to my directions, that after I go through the strawberries with a one-horse plow, I do nothing more till the weeds get ready to go to seed, when I take a strong scythe, mow them down, and leave them where they fall. It will be found that there are few or no weeds where you last plow, and what weeds there are, started mostly in the spring. Fall weeds you will not see. It requires frequent hoeing and plowing to bring them up. I should greatly prefer, late in the fall, to spread over them a light covering of straw, not so much for protection, for they will do well enough, as to furnish a clean bed for the berries, and, in particular, to keep the ground moist, in case the spring should be dry. From the benefits they receive from straw, and from the fact that so few apply it, I suspect that strawberries were successfully cultivated in remote ages, and hence that name. Virgil mentions strawberries, but they must have been wild ones. The Romans were not given to fruit raising, nor are slaveholders anywhere. They had no cherries till Lucullus brought them from Asia. As for giving them what is called a mulching of straw, that is, so much that any part of it is to be removed in the spring, I think it likely to do more harm than good.

"During the winter get your baskets or boxes, and such side boxes and packages ready. We use here quart hoop boxes, some with covers, some not. I prefer covers. For pickers, engage married women; if they are a little cross at home, so much the better, they will be more active. Handsome girls won't do, and children I would not have, for, though they do well for an hour or so, they soon get so that they cannot work, being troubled with a kind of bloat. Active boys, twelve or fourteen years old, are very good, they do not bloat so bad.

"As you go through the rows of scarlet richness you will see the advantages of ridging; for, from the crest of the ridge down into the gutter they are full, and where there are little precipices, see how thickly they hang over the edges. You will also see that in places where the ground is of a dead level, caused by washing, or other means, they are not so good; sometimes they do not bear at all. Whatever benefits arise from tile drainage are derived by ridging.

"When you get through picking come on with your heavy plow; tear through the ridges and make new ridges across the field; the old plants will send runners over to the fresh earth, and the next spring sees you with another crop. So, indefinitely, shall you raise strawberries, and as easily as you can corn.

"Now, how much? as everybody says who expects to pay or to receive money. Two hundred bushels are said to grow on an acre. Fifty bushels should content you. Still men come forward with, "so many feel this way, so many that, then so many quarts, consequently so many bushels, hundred bushels to the acre." Farmers cannot always draw prizes. The great trouble with everybody is, they have drawn some blanks when they expected always to draw prizes. Failures run through the fruits of industry as much as streaks of lean do through pork. For instance, we here, who have from one acre to five acres of strawberries, each thought ourselves moderate in expecting a hundred bushels to the acre. It has not rained for four weeks. We may have fifty bushels; I think not so much. There is always something the matter—frosts, low prices, or something else. Nations and individuals are prosperous, not because they always are successful, but because they are not discouraged by reverses."

Mr. John G. Bergen.—I believe that with us flat culture is preferable to ridging, our land being sandy. The best practice is to take a piece of land free from weeds, after thoroughly plowing and making the land mellow, mark it off as for corn, four feet each way, and set two plants in a hill, keep the ground in good tilth by the plow, then use the cultivator until the vines have run so as to prevent further work. It is better to tear up some of the runners than to neglect the summer cultivation. This we consider a cheap mode of culture, and will be found to pay.

"Field and Garden Culture of Strawberries" was made the subject of discussion for the next meeting.

Adjourned. JOHN W. CHAMBERS, *Secretary.*

June 3, 1862.

Prof. Renwick, Corresponding Secretary of the American Institute, in the chair

California Wine.

A letter was read from Mr. Peter B. Mead, one of the editors of the Horticulturist, introducing Mr. Graef, of Brooklyn, who is the agent of Messrs. Sainsevain Bros., of California, proprietors of extensive vineyards in Los Angelos and Santa Clara counties, California. Mr. Graef wishes to bring these wines to the notice of the Club.

On motion, the subject of wine was made the special subject for the next meeting.

Barren Grape-vines.

Solon Robinson read the following letter from C. L. Foster, of Topsham, Vt., which was written in answer to a statement made at a previous meet-

ing of the Club, ridiculing the idea that grape-vines ever blossom without bearing fruit. Mr. Foster says:

"If a grape-vine grew vigorously, and never blossomed, I should think there was a defect in its cultivation; but I feel certain that there are 'flowering grape-vines' which will not bear fruit. The largest grape-vine I ever saw grows indigenous upon the banks of the White river. It has had an abundance of blossoms every year for twenty years, but no fruit; although great pains have been taken in its cultivation, and, I might add, there is no other grape-vine within the distance of a mile. If the grape is ever diœcious, then, of course, it may flower without bearing fruit; and that some species may have perfect flowers and others not, is no more strange than the same fact as regards the strawberry and raspberry.

"All the works on botany which I have consulted agree that the flowers of the Vitis Vinifera, or Wine grape, are perfect; and those of the Vitis Labrusca, '*like most of the North American species, are diœcious.*'

"An examination of the flowers would, of course, settle the question whether or not they are self-fertilizing."

Mr. Pardee.—If we could get the flowers of this vine and test it under the microsoope, some facts might be gained that would settle the question.

Mr. E. P. Doughty, of New Jersey.—I have two grape-vines growing upon my place very vigorously, one of them running upon a fence, the other upon shrubbery, both of which blossom every year, and the flowers are fragrant; and I believe neither of them ever produced a grape. One of these I bought for a valuable white grape; the vine was quite large when I set it, and during the first years I trimmed and cultivated it carefully, but as it produced nothing, I have since let it take its own course. Here, then, certainly, are two barren grape-vines.

The Chairman, Prof. Renwick.—It would be very easy for a botanist to examine the flowers of one of these barren grape-vines to determine whether or not they are *diœcious;* and I suggest that Mr. Foster should send some of the flowers of his vine to us for examination, as Mr. Doughty says it is too late to examine the flowers of his vine this year.

Mr. Carpenter.—I do not think one would need a glass to examine the flowers of a grape-vine, and I do not see why a grape-vine should not produce barren flowers as well as raspberries, strawberries and other plants. I have given up the cultivation of Allen's raspberry on account of the flowers being almost entirely of the pistillate variety.

Strawberries.

Mr. R. G. Pardee.—Although but few strawberries are wholly barren, it is very certain that some varieties are nearly so, unless some staminate plants of other varieties are planted near them. This is particularly the case with Hovey's seedling. It is certain that a large portion of the blossoms of apple trees, cherry trees, peach trees, etc., are barren.

Mr. Peter G. Bergen, of L. I.—I have a great many strawberry plants that prove barren in another way; they have not produced any blossoms this year. I am at quite a loss to know what to do with these plants—whether to take them out and destroy them, or let them produce runners. I am afraid the new plants would be barren.

Mr. R. G. Pardee.—I would cultivate and manure highly, and let them live.

Dr. Trimble.—I understood Mr. Fuller to say at a previous meeting, that the best time to set out new beds of strawberries was in September.

Mr. Carpenter.—I have looked into this subject, and think the reason is that the vines have blossomed in the fall. My vines that blossomed last fall have no blossoms this spring.

Mr. Robinson.—I never saw more blossoms on my vines in the spring as I saw on them last fall, and this spring they are as full of blossoms as ever.

Remedy for Rose Bugs.

Mr. Solon Robinson read a letter from D. Petit, Salem, N. J., giving a remedy for this pest of the farmer.

"In the discussion of the American Institute Farmers' Club, I perceive that pest to the farmers and fruit growers, the 'rose bug,' was introduced by Mr. Robinson.

"I will endeavor to give a remedy which, if carried out fully, will prove a satisfactory one; for I, too, have had my cherries 'eaten to the stone' by this pest, and have 'had them burrowed in apples,' and have had my grape blossoms destroyed by them. To rid myself of them I tried and adopted the following simple remedy, which, so far as I have carried it out, has proved entirely successful, viz:

"I ascertained, in the first place, that one of the vegetables they most preyed upon was radishes, or radish tops. When they had been most troublesome the year before, on my grape vines, I sowed near by, early in the spring, a patch with radish seed. These blossomed about the time the bugs just made their appearance (which is here on or about the first day of summer; I have known them to come as late as the eighth), and would attract or draw them from most other vegetables. I had a large tin cup made with a funnel-shaped tin to go inside, but not so deep as to reach the bottom. I then went around every day about midday during their season—which was from two to three weeks—bent over the radish tops and shook the bugs into the funnel-shaped tin, which let them down to the bottom of the tin cup, from which they could not extricate themselves, and they were destroyed. By this mode, if well attended to for one season only, they may be so far eradicated as not to be very troublesome the next year. It is now about twenty-five years since I first tried the experiment, and I have cleared two farms of these pests, so that we make but little account of them now, only to note their yearly return.

Mr. Pardee said he had often destroyed these bugs when they invested rose-bushes, by shaking them into a pan of water.

The Black Blight of Pear Trees.

Mr. Solon Robinson.—Some weeks since Wm. H. Pettit, of Elkhorn, Wisconsin, wrote to the Club for a remedy for the black blight in pear trees, which attacks the bark upon the body of the tree, which turns black and dies, and the wood under it often decays so as to kill the tree. He now sends us the following letter upon the same subject:

"The pear tree (a Flemish beauty) about which I wrote you a short time since has leaved out fresh and green as any tree I possess, and notwithstanding Mr. Carpenter says there is no remedy for it, I am going to try one experiment upon the bark, to wit: I am going to cover the bark on the body of the tree with a thick coating of tar. Tar is said to possess healing virtues for sore lungs and other ailments of the human body, and I am going to see what effect it will have on my pear tree. I can't say I have much faith in my medicine; I don't believe it will injure it any.

"I ought to have told you in my other letter what I supposed caused my pear tree to show signs of disease. It stood not far from a spout which conducted off the water from the roof, and the rain of last summer was so frequent and liberal, that the water from that spout sank into the ground at the roots of the tree, and drenched them to almost drowning. I shall have to make a conductor to convey the water off from the tree, or my tar will be of no avail.

"If I succeed in saving my tree I will let you and the Club know. If I fail, perhaps the symptoms of its final dissolution and departure from this sublunary sphere I will watch and send you."

Mr. Carpenter.—I think that Mr. Pettit will kill the tree.

Mr. A. S. Fuller.—Some years ago I removed a good many trees from a nursery, where they had stood ten or twelve years, and afterward found a large number of them affected more or less with this black blight. A few of them died, and others recovered. I noticed that the disease afflicted some varieties much more than others. Those which naturally produce a rough bark appeared to be affected the most. Some of the smoothest barked varieties escaped entirely. I have never found any remedy for this disease. If good cultivation is given to the ground, and the right kind of fertilization, and for this ashes are valuable, the trees will often outgrow the disease. The only benefit of tar would be to preserve the dead wood from decay until the scar might be partially healed over.

Mr. John G. Bergen.—It is possible that tar has sometimes killed young trees, but I doubt it unless it was coal tar In our neighborhood young trees are often tarred to prevent the goats from eating the bark.

Dr. Bliss.—A few days since I was at Hoboken, N. J. I saw a number of young trees planted out; they were all tarred; it appeared to prevent all shoots from starting on the tarred part, but above the tar they were growing vigorous.

Mr. Solon Robinson.—If tarring fruit trees will kill them, nearly all the orchards in the eastern part of Connecticut would have been destroyed long ago, for they were tarred regularly every day for some weeks during every spring, when I was a boy, to keep the canker worms from ascending. The tar used was that procured from pine trees.

Mr. Wm. S. Carpenter.—I have one fact about tarring trees. I had a cherry tree which was liable to being gnawed by horses, and I tarred it to prevent that, and the tree died; I don't know that tar killed it, but I should be afraid to try further experiments.

Mr. A. S. Fuller.—Well, I am not, and I will try it upon a variety of trees, and know to a certainty whether tar will kill them.

Field and Garden Culture of Strawberries.

The regular subject of the day, "Field and Garden Culture of Strawberries," was then called up.

Mr. R. G. Pardee.—I consider spring planting as far preferable to autumn. The plants are more likely to live, and are pretty sure to bear a full crop the next year, while plants set out in autumn often make feeble growth, and seem never to recover their full vigor. Wilson's seedling is a variety that needs and will bear higher manuring than any other sort. I have noticed frequently that it is a rare chance for plants set after July to produce a crop the next year. I have tried all seasons of the year, and know that spring planting is best. I am aware that some persons are very successful in summer and fall planting—Mr. Fuller for one, but I notice he shades his plants with boards. All staminate plants produce more runners than pistillate plants, but none produce fruit and runners at the same time. If it is an object to multiply plants, they should not be allowed to bear fruit. New plants can be produced at a very rapid rate by stimulating the roots, and the best thing for the purpose that I ever tried is sal soda dissolved at the rate of one ounce in three gallons of water, and that applied copiously. I have also used copperas in about the same proportion, and so I have sulphate of potash, with wonderful results. I once had eight plants of a very choice variety of strawberries, and a gardener offered me thirty-one cents apiece for all the good plants that I would deliver him in the fall, and by means of this stimulating process I had a bill of over $100 against him. It is no use to say that pure water would produce the same effect; it is not so—that I am fully satisfied of from numerous experiments. Soap suds make an excellent application for strawberries. There are some beds that will not produce fruit by any kind of fertilizing, because they lack staminate plants. The sal soda application that I have mentioned, if applied to a lawn, will double the grass in thirty days. I have satisfied myself that the more we dilute the stimulating fertilizers, the better for the crop. One spoonful of guano in a pailful of water is better than a pound. To make a new bed of strawberries I would recommend the use of the salt and lime mixture to the ground, and then plant it with potatoes, and after the crop is gathered plow the ground well and plant the vines in rows three feet apart, and one foot apart in the rows, use the cultivator freely, and thin the runners out so that no plant should have less room than one foot. I believe that 150 bushels can be raised on an acre. Never let your strawberries mat.

The Chairman remarked that farmers should remember the distinction between sulphate and carbonate of potash; the first is a neutral salt.

Mr. Adrian Bergen, of Long Island, inquired if the several salts mentioned would suit all kinds of vegetation.

Mr. Pardee and the Chairman both replied that there was no doubt about the beneficial effects to all crops, of soda, potash, copperas, guano and many other articles, if applied in as weak a solution as Mr. Pardee used for strawberries.

Mr. Wm. S. Carpenter attributed much of the benefit supposed to be derived from the soda, etc., to the water, as strawberries are extremely

thirsty. He thought it was the drought last year that gave the barrenness of blossoms to Mr. Bergen's plants. He said: I don't know but sulphate of potash applied in weak solution will make plants produce runners; but I do know that ashes, although the best kind of manure to make plants produce fruit, are the worst to make them produce runners. To obtain plants in a small way, of choice varieties, my practice is to manure highly, and strike the plants in thumb pots. It is my opinion that the barrenness of some strawberry beds this year arises from their putting forth so many flowers last fall.

The Chairman.—That theory will not do, because in California, where they are all grown by artificial watering, they regularly produce two crops a year, and at Los Angelos the strawberry plants are blooming and fruiting all the year.

Dr. Trimble.—I should like to know how we are to settle the question, whether to plant strawberries in the fall or in the spring, or whether to manure or not, when there are so many conflicting opinions.

Mr. John G. Bergen —I have no doubt that spring is the best time to plant for field culture, where I live, on the light soil of Long Island. I have seen plants set out in summer from the first runners, that produced a good crop the next season, but as a general thing plants set out in autumn do not produce a good crop the next year; so I think it best to plant in the spring, and tend them well that season as long as it is possible to use the plow and cultivator on account of the runners, and then let them be, and next year get a good crop without any more labor, and then plow all under, and at the same time have a new plantation coming on. By this means we can use plenty of manure. I would say that in my young days we used to raise strawberries for market. The Crimson Cone and Scotch Runner were the kinds approved of in those days. I have had a good deal of experience in growing strawberries for market. If I am using old ground I prepare it thoroughly, as for corn, and then mark off the ground, four feet by four feet, and set the plants two in a hill, and work it both ways as often as two or three weeks. I also believe in hoeing strawberries as much as I do corn. I have sold $300 an acre from the first crop, and, when I have tried to preserve the same vines for a second crop, have rarely exceeded $100, unless it was on new ground.

Mr. Fuller.—I think if you plant strawberries for a field crop, say fifty acres, the plants should last five years.

Mr. Carpenter.—Some kinds must be cultivated in hills—the Triomphe de Gand, for instance. The Austin grows best in mass. I have always heard that hoeing the strawberry was condemned by most growers, but I think the ground should be kept clean and light. I like the hoe.

Rev. Mr. Weaver, Fordham.—I set 150 plants last fall, dressing the bed with horse and hen manure, and all lived, and now look remarkably well and full of fruit.

Mr. R. G. Pardee.—I tried six years and failed to get fruit, using manure freely in a good garden soil, and then by a different course succeeded in growing as fine fruit as I wish. I call a strawberry bed a good one when I can pick quarts of berries five inches around. For field culture, I would first make the soil very mellow by plowing and harrowing and subsoiling,

working the ground twice as much as I would for corn, in the fall and again in the spring, when I would set my plants, in rows three feet apart and plants one foot apart; never allow them to fill the ground, so as to stand nearer than a foot apart, except some of the smallest varieties might stand a little closer. The first crop ought to be 150 bushels an acre. If I could get spent tan-bark I would put it around the plants as soon as set, and this would prevent the weeds from growing near the plants, while the plow and cultivator would keep them down between the rows. I would not use a hoe, because the roots grow at the surface. The third year I would let the runners fill in between the rows and plow the old plants under. The English theory is to pack the ground hard all around the plants, and that is the practice when grown in pots.

Mr. A. S. Fuller.—I do not think I follow any person's practice, but I have a way of my own. I set 4,000 Triomphe de Gand plants last year, rather late in the spring, and, by manuring and careful cultivation, I have been able to sell 100,000 plants this year. My theory is to manure well, and to cultivate with the hoe all that I can. If I was working for fruit, I would use less manure than working for plants. If for hand cultivation, I would plant one foot by one and a half feet, and keep off the runners, and mulch the ground, and after the first crop dig under the plants.

Mr. Pardee.—Will Mr. Fuller inform us what kind of manure he uses?

Mr. Fuller.—The best kind of manure I have found for the strawberry is a mixture of one load of cow droppings and two loads of sod, composted. If you intend to use a plow, plant in rows three feet apart; if a scuffle hoe, eighteen inches.

The subject was continued for the next meeting.

Adjourned.

JOHN W. CHAMBERS, *Secretary.*

June 10, 1862.

Mr. Geo. H. Hite, of Morrisania, N. Y., in the chair.

Preserving Apples and Pears.

Mr. Wm. S. Carpenter presented some apples which he had received from Dr. Wm. Hibbard, of this city. They had been kept in the barrel in a cool cellar with the head of the barrel off. They are in size, shape and color like the iron apple, but are not of so good a quality.

Great attention is being paid to the preservation of fruits. I am trying some experiments, and shall next year be able to give the results.

I have found apples keep better in the upper tiers of barrels, when they are packed one upon another, than they do in the lower tiers. This is accounted for by the fact that the air near the ceiling of a cellar is in a much drier condition. The lower the temperature of the fruit room, if it is above the freezing point, the better. Last year I put up a number of barrels of Bartlett and Flemish Beauty pears, and stored them in my house, partially surrounded with ice, which kept the fruit perfectly sound until late in October, when they were brought to market and produced over $20

per barrel, which was more than double the price they would have brought when stored away.

Prof. Mapes.—I hope the Club will at a future meeting discuss the subject of detention houses. I think all the pears can be brought up to the proper period of ripening. I have seen fine Bartlett pears on the first of February

Gapes in Chickens—How to Prevent Them.

Solon Robinson read the following letter from a farmer in Mansfield, Tioga county, Pennsylvania:

"In the discussion of the Farmers' Club of May 17, on the subject of gapes in chickens, there seemed to be a lack of interest in trying to trace out the cause. One ounce of preventive, &c. This doctoring the effect with a horse hair, or trying to make a chicken less than a week old eat cracked corn, does not remove the first, if it does the secondary cause. How is it that nearly all our farmers are very particular to not breed in and in with horses and cattle, and partially with sheep and swine, while with fowls there is no attention paid to it, as though they were so small that it made no difference. I presume through the country not one farmer in ten even thinks of crossing or changing his breed of fowls, unless for some new large breed, like the miserable Shanghae or Bramah-pootre, never thinking that the medium or small size, like the creepen or bantams, are the best layers, and far the most profitable. How few farmers ever think of changing the place where their fowls roost, or where their chicken-coops stand, from what their fathers or grandfathers had them. Some thirty years since I occupied a place where my chickens were sorely afflicted with the gapes, and nearly all died. My fowls roosted in the same place of those owned by former occupants, or rather I had the fowls with the place. Perhaps these and their progenitors had occupied the same place for thirty or forty years. I just tore away the roost, and constructed another some rods from it that was open and airy, the six or seven warmest months, and could be easily closed the remaining part of the year. I am particular to remove all the manure every year, and to change the site of the roost once in three or four years; and also to change my male fowls every three or four years. I feed with Indian meal and water until the chickens are large enough to eat whole corn. My chickens, without exception, have been healthy for thirty years. My fowls never trouble me by scratching in the garden or elsewhere, for the simple reason I always give them corn enough to eat."

Rev. Mr. Weaver, of Fordham.—All that won't cure this disease, neither are these frequent changes of the roosting place necessary. If the room is kept clean there will be no need of change. Whitewashing and cleaning should be practiced often. As for breeding in and in, it is the fault of all poultry keepers. It is a fault of all fairs that they do not offer prizes for pure breeds. Prizes are more frequently taken by those who produce the largest fowls or the greatest assortment, and prize poultry is often of very poor quality. It is very difficult to get pure breeds when a number of varieties are kept together. I tried three years to get pure Dorkings, and

only lately succeeded. It is the same way with pigeons. I found the stock of nearly all the poultry fanciers mixed.

Mr. Carpenter expressed himself in favor of crossing, particularly some of the large China breed and black Spanish.

Mr. John G. Bergen, of Long Island.—I have invariably traced the disease called the gapes in chickens to feeding them corn meal recently wetted. It should always be mixed a day before it is used; if not, it swells in the chicken's crop, and causes the disease. I have pursued that course for thirty years, and do not know that I have lost a chicken by the gapes in that time; and I only clean my hen house once a year, so that the gapes is not caused with me by not cleaning the roost.

Mr. R. G. Pardee spoke of a Jersey lady who has very fine success in raising chickens, who is very careful not to feed them meal recently mixed with water. For young chickens she prefers crumbs of stale bread to any other feed. This year she set a hen upon twenty-two eggs, and raised twenty-two chickens; another upon eighteen and raised seventeen; another upon fifteen and raised fourteen. It is a common fault with those who keep poultry, that they try to keep too many sorts at the same time. It is just as foolish for a person to try to keep all the varieties, as it is to try to raise all the kinds of strawberries in one garden. I was in one the other day where the owner had thirty kinds of strawberries. It would be much better for him to confine himself to two or three of the best sorts; and it would be much better for any person who keeps fowls to select the best variety for laying, and keep no other.

Mr. Weaver.—I do not think the Dorkings the best layers, but they have some other good qualities which make them valuable. They are fair layers, good mothers, grow to a good size, and are excellent for the table.

The Hessian Fly in Iowa.

Mr. Solon Robinson read a letter from D. W. Thynne, Lyons, Clinton county, Iowa, with specimens of the larvæ of an insect which is destroying the growing wheat crop in that State. He says:

"I herewith send you for your inspection, and that of persons skilled in the science, a specimen—say three or four of them—of a species of grub that threatens to devastate this section of country, and leave us entirely destitute of as promising a wheat crop as we have harvested in years gone by. From the ravages already committed by this insect, hundreds of acres are being plowed up for corn that promised a fair yield of wheat but ten days ago. On entering the wheat field, the blighted stems are quite discernible, as they are wilted, drooped and faded. On pulling down the leaves, the insect can be found between the outer leaf and the stem, generally on the crown of the root. If some philanthropist, on seeing those grubs, should publish a speedy remedy for their destruction, he will be the means of saving countless acres of the great 'staff of life.'"

Dr. Trimble.—These specimens are very imperfect, but I believe they are the larvæ of the Hessian fly—an insect that has long been a dread to wheat growers.

Mr. Solon Robinson.—The description of it given by the letter writer corres-

ponds with my observations of the habits of that insect, which has been such a great wheat destroyer, although itself so minute. I am sorry to hear it has made a lodgment in Iowa. I know of no remedy that we can advise the gentleman to apply to save the present crop.

Dr. Underhill, of Croton Point.—There is no remedy for the present, but there are several methods of preventing the ravages of an insect that nearly drove wheat growing out of all the eastern States. Perhaps the best remedy is to sow early, and let the wheat get a good start, when the egg is deposited in the stalk. Then feed off the field with cattle, and if there are signs of the insect in April, feed off again. Horned cattle are better than sheep, which are apt to bite too low and injure the crown of the root.

John G. Bergen.—This insect was first discovered upon Long Island after the ground had been occupied by the Hessian troops, brought over by Great Britain in the Revolutionary war, and it has existed there ever since, though of late to a very limited extent, as it does not multiply rapidly in anything but wheat, and that has not been much grown on the Island, and since the wheat growers were first driven to abandon its cultivation by this pest. Those who still grow wheat find the most effectual remedy in sowing very late, for then the wheat does not get sufficient growth to enable the fly to deposit its eggs in the stalk.

Dr. Underhill.—That will do upon the light, sandy lands of Long Island, but it would not answer upon a stiff clay soil. There the feeding process would be preferable.

Solon Robinson.—It would never answer to recommend late sowing for most of the wheat lands of Iowa and Illinois, because unless early sown it is liable to be winter killed; and feeding in some wet seasons would be bad, because the hoofs of the animals would poach up the clay and trample the wheat all into the mud. If the Hessian fly once becomes established in the west, I fear that it will drive winter wheat out of cultivation there as certainly as it did here.

The subject of the day was then called up.

Mr. H. A. Graff, of Brooklyn, a gentleman well acquainted with foreign wines, having become satisfied that those of California are worthy of attention, brought the subject before the Club. He produced six samples of the vintage of 1858 and 1860, from the extensive wine vaults of Sansevain & Brother, and Kohler & Froling, made from what are usually termed "California grapes," and which ripen so perfectly in that climate that there is no occasion to add cane sugar nor spirit to give the wine strength.

Three of the samples are called Alizo wine, marked at $5, $6 and $8, respectively, according to quality, per dozen bottles, as the price the makers can afford to sell them at in New York, if there is a demand, and probably if there should be any considerable demand these prices might be reduced. We did not learn whether there is any stock of California wine for sale in the city, beyond a small quantity sent to Mr. Graff as samples, to see if there may be a demand.

The sample No. 4, marked $8 a dozen, called Angelica, is undoubtedly made from very ripe grapes, dried until almost fit to pack for raisins, which gives a juice as rich as prepared cordials. It is doubtful if it would sell in this market.

Sample No. 5, marked Port, $8, is probably a much purer wine, and really better than nine-tenths of that imported under the same name, and for those who love a strong wine of that character, and are not afraid to look upon the wine "when it is red, when it giveth its color in the cup," this California Port will be an acquisition, as it will bear transportation better than the light wines called Alizo, which compare with first class Rhine wines, or the French Sauterne.

No. 6 is a sparkling wine, marked $13, and is really a very excellent sample of the kind we call Champagne; very far superior to much that is sold as such in this market. It appears to have been well handled, is perfectly clear, and sufficiently lively and sound, but requires age.

Mr. Roberts.—It appears, from comparison, that the grapes grown in California are not natives, but foreign varieties.

Mr. Robinson.—The grapes are undoubtedly foreign varieties, introduced by the early missionaries.

Prof. Mapes.—I am very glad that these wines have been exhibited, and that so many ladies and gentlemen have had an opportunity to taste wines of American vineyards, that we have no reason to doubt are pure juice of grapes, without addition of foreign materials; and I contend that nothing is worthy of the name of wine, nor the attention of wine drinkers, that is made drinkable by adding sugar, which, in its fermentation, produces alcohol. These Alizo wines, particularly the one of the vintage of 1858, is fully equal to the best Rhine wine or Sauterne. It is well worthy of the attention of those in want of a light wine—pure fermented grape juice. These are very sound, possessing just spirit enough to preserve them, and have a fine, fruity flavor, with a little of that pleasant bitter taste, that when once acquired is highly approved by those who use this class of wines. In this I think the California gentleman decidedly successful. On the contrary, the Angelica is a failure. It is too strong for a "ladies' wine," and a bottle full of it contains I don't know how many headaches. Besides, I do not think that the ladies of New York drink wine enough to make it an object to manufacture sweet wines for their exclusive use; and, as a general thing, the men are not fond of it. So this sample would not find a good market here. The sample of Port bears a very fair comparison with the red Burgundy from the vicinity of Marseilles. It ranks between Cape Port and Tinto Madeira, and is like the red Catalonia wine, and is really a good sample of its class, and will no doubt meet with favor in this market at the price it is offered for. It is a sound, pure wine, of good body and flavor. Of this sample of sparkling wine I cannot speak too highly, and I am satisfied that every one who has tasted it will fully indorse what I say. It is a perfect success. It is well fined, fermented in the bottle, is entirely clear and free from sediment, and is truly a good, sound, dry wine—dry in opposition to tart, without being sweet. This wine will suit the fashionable taste of the day. Still, I look upon the first three samples, the Alizo, as the best and really true wines, as I understand the term.

These sentiments were unanimously approved, though John G. Bergen could not help calling to mind the fact that Solon Robinson had once introduced some samples of wine which members smacked their lips over and

thought excellent, until he told them it was made of rhubarb (pie plant) stalks.

Dr. Trimble.—I like this champagne, but I am afraid it will not meet with favor among those who drink the most of the article sold in this city under that name.

Mr. Solon Robinson.—I think the samples shown to-day prove that America is capable of producing its own wine, and that we are really independent of the wine countries of Europe; and as Americans we ought to encourage American productions.

Mr. L. A. Roberts read a letter from a friend in California who has twenty-seven acres of vines, planted on a gravelly soil, which he declares are all foreign varieties, and that the Isabella, Diana and Catawba grapes are of no account in California; but, with the sorts they have there, he believes that they can make just as good wine as can be made in Europe, and more to the acre, the soil being more productive.

Mr. Solon Robinson.—The Catawba grape wine, made by John L. Mottier, of Cincinnati, is a good, pure, wholesome wine, and, though pretty acid, it is a very pleasant one, and never produces heaviness nor headache, and a person would have to drink a great deal of it to produce intoxication. It is an excellent, light, pure grape juice wine.

Prof. Mapes.—In all situations where the Catawba fully ripens it makes a very good wine.

Mr. R. G. Pardee.—I find that it is not strong enough to keep. It turned to vinegar in a moderately warm room in my house.

Prof. Mapes gave a very interesting history of the manufacture of spurious wines and liquors, and how any particular flavor can be obtained by the aid of fusil oil, which is a product obtained by distillers of grain, by mixing it with the proper acid. Tannic acid and fusil oil, for instance, give the exact flavor of strawberries. The production of this fusil oil has become an extensive branch of trade, and it is so cheap that it is used to adulterate dearer oils, and it is certainly very largely used by manufacturers of brandy and other liquors, and "flavoring extracts," such as soda drinkers use. It is anything but wholesome. An immense quantity of "first rate old Bourbon whisky" is made of the newest kind of whisky, rectified and doctored with fusil oil.

Brandy contains fusil oil naturally, and some of it not in sufficient quantity to be deleterious when the brandy becomes aged. But we get very little pure brandy here, as the French distillers understand how to mix whisky and New England rum, deodorized by charcoal, with a little brandy and fusil oil to give it the right flavor, and color it with caramel.

The only distilled liquor free from fusil oil is what is called pure spirit, which has been passed through charcoal till it loses all color and odor, and nearly all taste. Charcoal or clay will deodorize all fruit and render it tasteless.

Mr. Andrew S. Fuller.—How little we know as yet about grapes. We do not know why the Isabella and others of those esteemed good here do not do well in California, and why the foreign sorts do, which we cannot grow here, except in glass houses. If we grow the Isabella under glass, we produce great bunches and large berries, with very thick, tough skins and

poor flesh. And this appears to be the case with them out of doors in California, on the same ground that produces grapes that will make wine as sweet and rich as the grapes of Spain.

From what we have heard to-day the results of native grapes in California seem to be similar to growing our native varieties under glass, which is a perfect failure. The Herbemont is claimed as a native, but I have no doubt is from foreign seed, and when grown under glass has all the distinctive characteristics of a foreign grape.

The only variety of grapes from which wine has been made to any extent here, of sufficient excellence to command a market, is the Catawba, which I believe will be entirely superseded by the Delaware.

Subject for the next meeting: "Detention Houses for Fruits and Strawberries."

Adjourned. JOHN W. CHAMBERS, *Secretary.*

June 17, 1862.

Mr. Francis C. Treadwell in the chair.

Barren Grape-vines.

Stephen Haight, of Washington, Dutchess county, sent in the following communication upon this subject:

"Gentlemen: I am a constant reader of your discussions, and have discovered that you have got into a puzzle about barren grape-vines.

"Allow me to say that such things do certainly exist, as barren grapevines, and here I present the proof. I have two vines set by my kitchen door for the purpose of making a shade; have been there ten years; always blossom very full, and always fall from the vine before July overtakes them. They were both layers from the same parent vine. A native grape of excellent quality; ripens the latter part of August. I have others which were taken from the same vine, which are productive.

"Here are the samples for you to examine: one from the barren vine, and one from the parent vine."

Mr. William R. Prince, of Flushing.—The matter stated in this letter is absolutely impossible. Barren vines may and do often come from seed, but this specimen represented as a layer, and the other from the one which produced the other, must have been derived from some other source. The man must have been mistaken; his statement is contrary to science. There are particular kinds of grape-vines which produce fragrant flowers, which are all staminate, and have an odor like those of mignonnette; these are grown only for ornament.

Mr. Andrew S. Fuller, of Brooklyn.—The point at issue is, that some person made an inquiry here by letter, whether there were such things as barren grape-vines, and stated that he had one that blossomed freely and never produced fruit; another letter-writer ridiculed the idea, probably because he had never seen a barren grape-vine. I have seen them, said to be fifty years old, which never produced a grape. How, then, do you know they were grape-vines, if they never showed fruit?

Mr. Prince replied, by the science which determines their class and order as perfectly without fruit as with.

The New Law about Cattle in the Highway.

Mr. Adrian Bergen, of Long Island, introduced this subject, and stated that there were a great many persons who were ignorant of the fact that we have a new, good law, which, if enforced, will rid us of an intolerable nuisance. He therefore wished that the provisions of the law should be well understood by members of the Club, and that they would make it better known to others.

Mr. Solon Robinson.—I hold a copy of this law in my hand, which I will read, if there are any members desirous of hearing it. By the first section it is enacted that it shall not be lawful for any cattle, sheep or swine to run at large in any public highway in this State, and it is made lawful for any person to seize and shut up an animal found upon the public highway, or trespassing upon his premises. In short, it makes every man his own pound-master, and authorizes him to proceed summarily against trespassing animals, and if properly enforced will prove one of the best laws ever passed by the Legislature of this State.

Mr. Adrian Bergen.—It is very important to us on Long Island that it should be enforced, and I am determined for one to do my duty, and ask the support of all others to sustain me in doing it.

Professor Mapes.—This is a very righteous law. We have a similar one in New Jersey, where I have had occasion to test its efficacy. I do not pretend to close the gates of the road leading into my place; I leave them open on purpose, so that if any person chooses to defy the law, I will give him an opportunity to feel its effects. I made one owner of horses pay for the damage which they did in running through my hot-bed, breaking the glass and frames. It is contrary to common sense principles to suppose I am obliged to fence my neighbor's cattle off my premises. In New Jersey we have pretty nearly succeeded in convincing those who have been in the habit of pasturing the highway, that they have no rights there.

Mr. Andrew S. Fuller.—I am glad to hear that Prof. Mapes intends to punish the owners of cattle straying into his premises. I have seen a hundred head of cows prowling in a body in the streets and vacant lots in Brooklyn. If one unruly one breaks through the fence, it may let in a whole army, and destroy $1,000 worth of nursery plants in a few minutes. I had eight cows in my nursery a few days ago, and one of my neighbors had the impudence to tell me that I must strengthen my fence, for he wanted to turn his cows out upon the common. These uncivilized cowherds claim it as their right to possess all land that is not fenced. There is a lot adjoining me, fenced at the cost of $7,000, with a wall ten feet high; and that is the only way to keep Brooklyn cows off your premises. I was at Flushing the other day, and found that everybody could enjoy the convenience of keeping gates open. I hope our police commissioners will instruct the police to pound all cattle running at large.

Mr. John G. Bergen.—I shall be glad to see this law strictly enforced, and it can be much more easily done than the old law, which required the animals to be first driven to the pound. Still I do not think this law repeals

the one creating pounds and pound-keepers, so that any one that chooses can follow the provisions of that law.

Inquiry about Grub Worms.

Mr. Solon Robinson read the following letter from D. L. Lamon, of Fryeburg, Maine:

"I have heretofore been much interested and instructed in reading the proceedings and discussions of the Farmers' Club. I think the thoughts there suggested and disseminated among the farmers of the New England towns through the press, have been read generally with great eagerness, and have led to much practical good. My object particularly in writing this note is to ask a consideration—at one of your meetings—of the subject of the grub worm, with a view to suggest a remedy against its devastation. The farmers, as well as horticulturists, in this western part of Maine, have been greatly exercised for the past three years on account of their abundance and destructiveness, and anything like a remedy will be hailed with joy.

"Neither salt, ashes, superphosphate lime, or severe winter's frost—which some say is necessary to kill the eggs—seems to decrease their numbers."

Mr. Solon Robinson.—As no one present can give the desired information, I hope some one of our correspondents will be able to communicate one.

Health, Happiness and Comfort for Children and Mothers.

Mr. Solon Robinson.—There is a gentleman present with a new agricultural implement, which he wishes to introduce to the attention of the members of the Club, and particularly to the ladies present. It is an implement of the utmost importance to them, for it will tend the baby while they are engaged washing, milking or churning; and as the baby and the tender are both present, I hope the inventor will be allowed to show it up now.

Dr. Brown, of this city, then introduced and explained the object and uses of this new machine, which apparently gave much satisfaction to all present. It is really an ingenious and valuable improvement upon all the projects heretofore introduced for the same purpose.

Mr. A. S. Fuller introduced a number of specimens of his seedlings; also specimens of the Triomphe de Gand and Downer's prolific.

Mr. Solon Robinson showed specimens of Hooker's seedling and Wilson's Albany; both specimens very large and fine.

Mr. Fuller said: I have nothing to say about any of these seedlings, except to answer questions and give explanations; but here are specimens of the Bartlett, now well established as a superior variety; and here is Downer's prolific, a very good sort, but not worthy of all that has been said in its favor. The Wilson I have always spoken favorably of as the most prolific of all strawberries, and if permitted to ripen fully, in a good season, its acidity is not very objectionable. It has a great many good qualities. The Triomphe de Gand is rapidly gaining in favor; it is a hardy sort, and very prolific, and of rather a sweet, pleasant flavor.

Mr. Prince disputed this point. He said: It is one of the characteristics

of the Triomphe de Gand strawberry that it is devoid of sweetness and perfume, which are the characteristics of the other varieties of the pine family, and ranks so low in Europe that it is only found upon two catalogues; and it is entirely rejected in Belgium, where it is said to have originated. It cannot be rated among the prolific varieties, because it won't bear a third crop—none of the fine varieties of the strawberry will, though cultivated for their high flavor, which is a characteristic of many European sorts. I have tried them all, and have now some 250 varieties growing—forty of them new, and some of the highest flavored ever grown. To prove it, I invite every one to come and see them and taste, and prove my assertion. There are six North American, two South American, and six European classes of strawberries, some of which are to be found growing all the way from 17° south to 64° north, embracing the torrid, temperate and almost a frozen region. The Chilian strawberry was introduced into Europe in 1712. All the North American varieties are hermaphrodite and pistillate. We have no native male variety, and all pistillates are superior to staminates or hermaphrodites for production, if properly fertilized by male plants set near them. This is the case with Hovey's seedling. We have not yet obtained great size and high flavor in any one berry of the Virginian family, but that they are usually combined in the Pine family. Many of the European strawberries are remarkable for their high flavor, but some of them are so for size and flavor combined. The Triomphe de Gand is a European variety of large size, but it lacks quality. As to productiveness, it is impossible for a hermaphrodite plant to be as productive as a pistillate, fertilized by independent plants. The Hovey, with a fertilizer blooming at the same period as itself, is very productive, but it is not by any means the most so, as many varieties produce much larger crops; and, as a rule, all pistillates are the most productive. Downer's prolific is a pistillate, and so are mostly all prolific sorts. I have a true pistillate, the Diadem, that is more productive than the Wilson.

Mr. Andrew S. Fuller.—This is a pretty strong assertion, and contrary to the opinion of all but Mr. Prince, and a very few who adhere to the pistillate variety. I have fruited a thousand sorts, and never have found a pistillate worth cultivating. I have tried all of Mr. Prince's sorts, and have never found one so good to produce as Wilson's, Downer's or Triomphe de Gand. The pistillate flower is not natural; it is a deformity, so far as science is concerned, like all double flowers.

Mr. Prince argued at great length in favor of his pistillate theory, contending that the objection all arises from carelessness in cultivation, in allowing the male plants to overwhelm the bearing plants. Among other objections to the Wilson strawberry, he said that it must be cultivated as an annual; it never produces a crop the second year from the same plants.

Mr. John G. Bergen.—This theory of Mr. Prince is not borne out by facts, for it is well known that the Wilson is the greatest bearer ever cultivated.

Mr. Solon Robinson.—The Club has just tasted of some of Wilson's strawberries, grown upon my vines set three years ago last spring. They speak for themselves as to size and quality; they are, at least, not small; many of them are an inch and a half in diameter, and considering the state of the weather not excessively acid. Now, these berries are the second and third

crop. Owing to the great drought last year the plants made no runners, so these must be the product of the same plants that were so productive last year. Yet we are told that this variety produces but one crop. Well, facts are stubborn things, and this is not the first one that has upset some fine theory.

Mr. W. S. Carpenter.—It is a theory that has no foundation, and all cultivators who have tried the experiment as faithfully as I have, know that the Wilson is the most productive variety known; and that it will produce two or three times as much as any pistillate variety, such as Hovey's, Scott's, McAvoy's and others, all of which I have discarded.

Zephyranthes Rosea.

A lady presented a flower which she has had growing for the last five years, but has never been able to find any gardener that could name it. It grows from a bulb that increases very rapidly, and is continually throwing up flower stalks. The flower is of a very delicate purple color, and requires to be taken into the house during the winter months.

Mr. Prince.—It is called the Zephyranthes Rosea, of the order of Amaryllidacea, of Lindley.

The strawberry question was continued as the subject for the next meeting.

Adjourned. JOHN W. CHAMBERS, *Secretary.*

June 24, 1862.

Mr. Wm. Lawton, of New Rochelle, in the chair.

Institute Prizes for 1862.

Mr. John W. Chambers, secretary of the Board of Managers, presented a list of awards on various subjects relating to agriculture, which had been adopted by the Board of Managers and referred to the Farmers' Club to examine and report:

1. For the best winter wheat—a new variety, equal to Mediterranean, one bushel to be exhibited................Silver Medal.
2. For the best spring wheat—a new variety, superior to any disseminated, one bushel to be exhibited.........Silver Medal.
3. For the best oats—a new variety, superior to any cultivated, one bushel to be exhibited ....Silver Medal.
4. For the best twelve ears of field corn—ripening early, and producing at least two ears to the stalk..........Silver Medal.
5. For the best peck of seedling potatoes—equal to the Peach Blow in quality for the table, and ripening earlier...Silver Medal.
6. For the best seedling pear ....Silver Medal.
7. For the best seedling apple ....Silver Medal.
8. For the best seedling grape ....Large Silver Medal.
9. For the best essay on the culture of the pear...........Gold Medal.
10. For the best essay on the culture of the peach ....Silver Medal.

11. For the best essay on the culture of the grape—both under glass and out of doors .... Gold Medal.
12. For the best essay on the culture of the strawberry.... Silver Medal.
13. For the best essay on the preservation of ripe fruit..... Silver Medal.
14. For the best plan of preserving fruit without sugar..... Silver Medal.
15. For the best essay on the cultivation of the potato...... Silver Medal.
16. For the best essay on the cultivation of asparagus...... Silver Medal.
17. For the best essay on the cultivation of celery .... Silver Medal.
18. For the best essay on domesticating animals .... Silver Medal.
19. For the best essay on poultry .... Silver Medal.
20. For the best mode of draining, accompanied by an essay on the value of the same on the various soils, with simple diagrams or plans, suggesting economical drainage .... Silver Medal.
21. For the best design for a forcing house for vegetables, propagating, raising seedlings, &c., all under the same roof .... Large Silver Medal.
22. For the best quarter cask of wine made from the grape, which can be afforded at one dollar per gallon........ Gold Medal.
23. For the best corn sheller that will not break the grain... Silver Medal.
24. For the best portable mill for grinding corn—for farm use .... Silver Medal.
25. For any improvement or new instrument—adapted to the farm and superior to any now in use................. Gold Medal.

The grains and vegetables will be required to be exhibited at the Farmers' Club, on Tuesday, the 15th day of December next. Those deemed entitled to the premium will become the property of the Institute, and will be distributed at the Farmers' Club.

The new seedling fruit must possess sufficient merit to warrant their general cultivation. They may be presented at any meeting of the Club.

The essays must be designated by a *nom de plume*, which is also to be superscribed on an envelope, inclosing the name of the author. After the judges have decided upon those entitled to the premium, the rejected essays will be returned to the authors, with their accompanying envelopes unopened. The successful essays will be published in the Transactions of the American Institute; but the copyrights will remain with the authors.

The Wine Premium.

Solon Robinson.—I object to the prize for wine, because it will open the door for the introduction of all sorts of stuff under the name of wine, such as has been heretofore offered for premium before this and other societies, some of which is no more worthy of the name than any other compound of fruit juice and cane sugar. I have no objections to the manufacture of any kind of drink from fruit and sugar, some of which is very good cordial, but I do object to calling it wine, or giving it a gold medal because it can be made cheap. I want the prize offered to encourage the production of pure grape wine, such as that we have tasted samples of in this Club, manufactured from Catawba grapes by John E. Mottier, of Cincinnati, or such as that we had the other day from California. But we must not yet look for

such wine at a dollar a gallon, and we must take care how we encourage the production of stuff that is unworthy of the name of wine, and much more unworthy to receive the gold medal of the Institute. With proper encouragement to grape growers, this will yet become a wine country, at least all south of latitude forty degrees. Let us look onward and upward.

Dr. Trimble, of New Jersey.—I concur entirely in these views. Let us offer prizes for none but the best. Get that, and cheapness will follow.

Prof. Mapes.—We have a great deal of pure wine imported into this city, and sold at less than $1 a gallon. This is true of claret and the light wines from the Rhine. No doubt exists in my mind that good wine will be made in this country at less than $1 a gallon, but I do not wish to see a prize offered by us that will allow of anything being offered but pure grape juice. Let the prize be for the best wine.

Wm. R. Prince.—I believe pure grape wines are sold in Cincinnati at less than $1 a gallon, but I would offer the prize for the best at any price.

The prize for the mill was objected to by Prof. Mapes, because we have now an abundance of handmills, and because grain never can be economically ground by hand-power. We do not believe this prize worth competing for.

The prizes for essays on fruit culture were objected to by Mr. Fuller, because not required to be original matter, and because the last one awarded for the culture of apples was to a man that does not pretend to know an apple tree from a pear tree. He objects to giving prizes for bold plagiarism. For one, he would not employ a jeweler to write an essay upon pork-packing. He wanted practical articles from practical men.

Prof. Mapes.—I would give the prize for the best essay, no matter who produces it, nor whether original or selected, if well done, and of practical value to the world.

Comstock's Rotary Spader and Digger.

Prof. Mapes.—Mr. Comstock, of Milwaukee, Wis., who has invented a new instrument for disintegrating the soil, is present, and I would ask Mr. Comstock to explain the machine to the Club.

Mr. Comstock.—The machine alluded to by Prof. Mapes has been recently invented and patented by me. It is capable of doing by horse power what a man can do with a good spading fork. Two horses are required, and they can fork up from four to six acres a day eight or nine inches deep, leaving it all in a finely divided condition, exactly resembling hand-work. Twelve shafts, each armed with several tines, like those of a garden fork, are placed around a pair of wheels two feet in diameter, and will cut a furrow two and a half feet wide; and the shafts are so arranged, that as they lift the earth, it is violently shaken so as to disintegrate all lumps. This is done by a cam motion, working very easily, and the whole operation only requires just the power that it would for a man to work a fork two and a half feet wide, except that the rapid motion, moving in a rotary manner, requires less power than it would to do straight spading.

Prof. Mapes moved that a committee be appointed to examine the machine in motion and report, which was carried, and Messrs. Carpenter, J. G. Bergen, Trimble and Fuller appointed the committee.

Patriot Orphans' Home.

Dr. D. P. Holton read a paper upon the subject of an experimental farm and home for patriot orphans. One feature of Dr. Holton's project is to make application to the State Legislature to establish orphans' homes on the experimental farms—homes whose scope and spirit, harmonizing with philanthropic deeds, may be developed in modes of reward, rather than those of alms-giving, thus testifying a grateful appreciation of the defenders of our nation, and thus rearing a monument to their memory; also, through the scientific and practical knowledge thus imparted to their orphans greatly increasing the resources and wealth of the country.

Effects of Marl.

Dr. Trimble showed some stalks of the dwarf marrow-fat pea, grown on marl in New Jersey, eight and a half feet long.

The Strawberry Question.

The miscellaneous hour having expired, the chairman called up the regular questions, one of which being strawberries, elicited an animated debate, principally on the part of Wm. R. Prince, of Flushing, who is the great opponent of all sour strawberries like the Wilson's seedling, and a strong stickler for pistillates, and those of the Pine family that are comparatively sweet.

Mr. Prince.—The greatest production of strawberries is in Ann Arundel county, Md., where there are six hundred and eighty acres, in plots of from two to one hundred and twenty acres; two men each having that quantity, and sending twelve hundred quarts a day to market, and realizing $10,000 a year. He said that two men near Cincinnati grow five thousand or six thousand bushels a year. We want no more sour seedlings, such as all are of the variety *Virginiana*. The seedlings of the Pine variety are all sweet. I exhibited the other day, at *The Agriculturist* office, seventy select sorts, and I have two hundred and fifty sorts on my catalogue, so that we do not need any more new seedlings, unless from the Pine variety, of superior size, form, beauty and flavor, to any now known. Four of my new seedlings are superior, and I have sixty-seven good ones. At the Brooklyn show, the other day, a prize of $10 was given for an old sort, exhibited as a new seedling, and the Bartlett and Boston Pine are one and the same thing.

We want a committee on strawberries capable of acute discrimination. All North American varieties are defective in female organs, and all South American are defective in male organs. The name of strawberry originated with children, who strung the berries upon straws and brought them into the city for sale.

NEW VARIETIES OF STRAWBERRIES.

Solon Robinson.—Here is a specimen of a strawberry that I obtained from Toledo, Ohio, under the name of Chilian. It is an excellent sort, not quite so large as the Wilson, nor quite as productive, not as sour, highly perfumed and good flavor.

Wm. R. Prince.—I know this sort, and it is wrongly named. It is one

of the Virginiana family, and has none of the characteristics of the Chilian; it is a seedling that was originated in the interior of this State.

Andrew S. Fuller, of Brooklyn, then showed quite a variety, among which is his new seedling, No. 53—one of the most beautiful, large, bright-scarlet berries we have ever seen. Its shape is conical, flesh firm, white interior, juicy, rich, highly perfumed, and very superior.

Mr. Prince objected to all of Mr. Fuller's seedlings because of the Virginiana variety.

Mr. Fuller.—Americans like this variety; they do not like the Pines, because none of them produce largely. But few of the European sorts are productive in this country, and cultivators for market will not have any sort that is not productive. The Triomphe de Gand is more productive here than in its place of nativity, but the Oscar, a good European sort, does nothing with us. The quality is good, but it will not produce a satisfactory crop. The La Constante is very good and tolerably productive. This is a specimen of it: a large, handsome berry. The Bonne St. Julian is very good, and so is the Malakoff, but not productive. The Deptford Pine is tolerably productive. This is the Malakoff—large and homely. Here is one called the Crimson Green, good and handsome, but not productive. This is Trollopp's Victoria, and is believed to be identical with Boyden's Mammoth. This is the Wizard of the North that made a great noise in Scotland. Here it is not large, and is dark-colored and unattractive. Here is one of my seedlings, that is very excellent, but so dark-colored that I shall throw it away.

Subjects for the next meeting: "Mode of Constructing County Houses and their Surroundings;" "Fruit Rooms and Detention Houses;" "Small Fruits of the Season."

Adjourned. JOHN W. CHAMBERS, *Secretary.*

July 1, 1862

Dr. Hawkes, of New York, in the chair.

Ant Hills.

A member asks: Is there any way to destroy ant hills? Our flower beds are nearly ruined by these industrious little workers.

Mr. Wm. S. Carpenter.—I have been troubled in the same way, and find boiling water the best remedy. Pouring it from the tea-kettle spout upon the ant hill, it cooks and of course kills the eggs and young ants.

Wm. Lawton.—The same process applied to weeds and grass growing in brick pavements is the best remedy that I know of.

Apple Tree Blight.

A friend writes from Tipton, Cedar county, to ask if any member of the Club can tell him how to save some apple trees that are dying. He says: "A very thrifty tree. I have searched root, body and branch for the cause; have cut off all the rough bark of the body, but have found no sign of bores, and though I cannot discover any cause for it, the tree looks out-

side like a dead tree, so covered in dead leaves. The tree stands on the south side of a high fence and willow hedge, not more than two and a half feet from the hedge. Some currant bushes shade the ground under the tree, and I found on digging out the dirt it had accumulated around the tree five or six inches higher than the proper level. The ground this spring has been quite wet. Now, can you give me any advice what to do to save my trees, for I perceive that another one, ten feet distant, is going the same way, while it hangs full of apples. I find on cutting the twigs that have begun to die that the wood at the heart is black, while the thrifty twig of the same size is bright."

Mr. Carpenter said: This appears to be the same disease as the pear blight, for which no remedy is known. I have lately observed something like it in a neighbor's orchard. In one case it was attributed to a wound in the tree. We know death sometimes occurs from trimming off large limbs. If an orchard is properly managed they should be trimmed when young.

Mr. Wm. Lawton.—I have trimmed very large branches off my apple trees, and have seen no ill effects. When you find trees in this state the excess of wood must be removed, or they must always remain unsightly; but the wounds must be properly taken care of.

Solon Robinson.—The fire blight is most apt to occur in trees grown upon the richest soil, and in just such places as described. I would clear away the bushes, and make the land poorer, if possible. Lime, sand, gravel or stones, might be applied to the surface with advantage.

Preserving Fruit in Air Tight Cans.

Mr. C. S. Osgood, of Coos, N. H., asks "whether, in preserving fresh fruits in sealed cans, it would answer as well to exhaust the air by means of a pump as by the usual method, by heat; as the flavor of some fruits, especially the strawberry, is materially injured by even so little heating as is required to raise steam. I know that according to theory it could make no difference by what means air is expelled; but as there is often a wheel within a wheel, first sight theories and second thought practice are often found not to agree, so I would not dare rely on the air pump for more than a mere experiment, till better informed than now, as perhaps the slight working of the usual way helps in the preservation, and perhaps the slow process of raising the heat disengages the air combined with, or contained in the fruit and their juices, more fully than would be done in the much shorter process of the air pump. But if it is known that the exhaustion of the air by the pump is equally effective, I could give such directions as would enable any one knowing something of the principles involved, and having a tolerable aptitude for tinkering, to construct a pump and use it with success and little trouble. For myself to get up the necessary apparatus ready for operation, would only involve an expense of some ten cents, and two or three hours' amusement."

Prof. Mapes.—I have had a good deal of experience in putting up various fruits and vegetables in air tight, exhausted vessels, particularly mushrooms, which the French do put up by pumping out the air; but some things are very difficult to preserve in this way, because it is almost

impossible to exhaust the air from the interior of the fruit. A raisin contains air enough within its dried skin to swell it out if placed under the receiver of an air pump. The French cans are broad, which allows a large surface to sink in when the air is pumped out, and to rise again if air is generated within. If the can is found with the sides swelled out, the fruit is not well preserved. I do not think it would answer to put fruit in long, narrow bottles and pump out the air; there would be no room for expansion, which will arise from imperfectly extracting the air.

Planting Trees along the Highways.

Mr. Robinson read the following communication from Mr. W. O. Duvall, Port Byron, N. Y.:

"The last Legislature passed an excellent act, prohibiting animals from running at large in the highways. Though, to a change so radical and sudden, considerable opposition manifests itself, yet, as a general thing, the law is obeyed, and the roads which heretofore have been almost nuisances, are now sources of comfort to the traveler. One of the ill effects of poverty is to make its victim cruel and hard hearted. Though the poor man, who has been in the habit of using the highway for pasture in summer and barn-yard in winter, knows full well that his cow was daily clubbed, stoned, dogged, and in every other way maltreated; yet, if she only produced the milk, he gave himself no trouble in the matter. This beneficent law is a God-send to these hitherto shamefully abused animals. Allow me to suggest the passage of another law, which, in my opinion, would produce more substantial good than any act passed by the Legislature since the organization of the State government. Let the next Legislature enact that land-owners line both sides of the highways through their land with the different varieties of fruit trees, subject to the supervision and control of the road masters, who shall see that they are protected from all harm, with full power to annex penalties and collect fines for any damage done to the trees or fruit. Now that the streets are divested of animals, this most beneficent act is perfectly practicable; and what a source of happiness it would be to the poor and the children of the landless. By a little legislative care, 1880 might find the highways of the Empire State so lined with trees abounding with fruit as to prevent the possibility of a famine, were all other crops a failure."

Prof. Nash.—The writer of this letter is more philanthropist than lawyer or politician. I would gladly see the roads lined with trees; but I would appeal to the people, not the Legislature. I have long since appealed to land-owners to plant trees by the roadside. I do not think the Legislature should enact compulsory laws on the subject.

Mr. Solon Robinson.—I agree with Prof. Nash in this respect; I would not compel, but I would induce, by offering bounties, by relieving part of the road tax for every tree planted; and I would have the present law enforced, and other laws for the protection of the road. People need to be set right about the ownership of the road. Every land-owner owns the road adjoining in fee simple. He has only granted the right of travel on his land to the public. The grant does not give them any right to pasture their cattle by the side of the path. Let us keep agitating this subject

until we get people to think and act, and then we shall have our roads beautified and rendered beneficial.

Mr. Adrian Bergen.—I am pleased with the law passed by our Legislature; it is a good one, and begins to have an effect. It needs all the united force of all good men to teach the lawless to respect it. Then we may be able to grow trees, though there is another danger. I once planted a dozen trees along the road, and they were stolen the first night. We need a strong law to protect trees and fruit from depredators.

Prof. Mapes.—It is common in Germany to line the road with trees, and a portion of them the owner marks by a white cord for his own use, and travelers never molest them. I hope the plan will be carried out in this country by means of planting associations, and as ornaments and improvements much needed upon our highways.

Prof. Nash.—We cannot protect fruit on the roads nor in orchards by law; it must be by public opinion. In this country, if the roads were well set with fruit trees, we might give half to the public, and then all the landless would have a share, and land-owners should bless God that they could give that class a little fruit. But if owners got none from the roads, it would be much better to have them set with trees than to be left in their present wretched condition. Thirty years ago the people of Northampton, Mass., formed a Fruit Protection Society, which has had the effect of producing a public sentiment opposed to all fruit stealing.

Mr. Wm. R. Prince.—I like this plan of planting trees along highways. Let us continue to agitate the subject until we get people to think and talk about it. What vast quantities our roadsides would give to the poor.

Mr. Wm. Lawton recommended forming planting associations, particularly in villages.

The Chairman stated that the village of Clifton, N. Y., raised a fund by subscription, and planted the roadsides with fruit trees, which add much to the beauty of the place and value of the land, indepent of the annual supply of fruit.

Mr. Carpenter thought it would be easier for villages to carry out this idea of planting roadsides than for farmers in the country. If the cattle law is rigidly enforced, we shall soon find that trees will be planted.

Strawberries and Cherries.

Mr. Geo. Clapp, Auburn, N. Y., exhibited some of Russell's beautiful seedling strawberry; and Mr. Wm. R. Prince exhibited two new and rare varieties of Hautbois, whose color is always a dull, brownish red, but of the most exquisite flavor, and which have, in consequence, acquired the title in France of *La Fraise des vrai Amateurs*. The other was a distinct species—Fragaria Collina, or green pine-apple, a native of the Alps. Its color is a dull green and red, but the flavor is delicious. These are rare novelties, and have never been before exhibited by any one. Mr. Prince also exhibited some large, fine looking cherries, the flesh of which was very firm.

FULLER'S SEEDLING STRAWBERRIES.

The committee appointed to examine Mr. Fuller's seedling strawberries, submit the following report:

The committee have heretofore spoken so fully of the value of Mr. Fuller's labors in the production of seedling strawberries, that they deem anything further on that part of the subject uncalled for. They have several times visited Mr. Fuller's beds, and given them a thorough and careful examination. They are now, therefore, prepared to present the results of their matured opinions. There are three seedlings among those examined during the past two years, which possess decided claims to consideration; the others the committee have thrown aside, and among these last they are sorry to include No. 20, a large and productive variety of handsome color, but deficient in flavor. The committee will here state, that in arriving at their decision, they were governed by size, quality, productiveness, earliness, color, firmness and general vigor of plant, and they have selected those possessing these points in the greatest degree. The three varieties selected are numbered 42, 7 and 53, the preference being in the order in which they are named. There is but little difference to the general observer between 42 and 7, yet, pomologically, they are distinct. The preference has been given to 42 over 7, because it is a little firmer and more juicy. They are both valuable kinds. Number 53 is placed last, simply because it is much later; in other respects it is the best of the three. If it had been a little earlier it would have headed the list. Even as it is, it is a very valuable kind, and will take its place among the best.

The following is a description of the three best, which may hereafter be useful to identify them.

No. 42.—Berry very large, obtuse conical; color scarlet; flesh white, firm, and moderately juicy; seeds dark brown, prominent; calyx large and only moderately persistent; foliage large, coarsely serrated; flower stalk stout; flavor very good; quality, best; very productive and early. *Staminate.*

No. 7.—Berry very large, irregularly conical; color crimson scarlet; flesh light red, moderately firm, not very juicy; seed dark brown, imbedded; calyx large and not persistent; foliage large and coarsely serrated; flower stalk stout; flavor good; quality, very good; very productive and early. *Pistillate.*

No. 53.—Berry very large, conical; color bright scarlet; flesh white, firm and juicy; seed brown, prominent; calyx large, persistent; foliage medium, dark green, coarsely serrated; flower stalk stout; flavor very good; quality, best; very productive but late. *Staminate.*

In conclusion, the committee would commend Mr. Fuller's seedlings, as here selected, as entitled to some substantial reward at the hands of the American Institute. They will take their place among the most valuable kinds that have thus far been introduced.

All of which is respectfully submitted.

PETER B. MEAD,
Chairman.

WM. S. CARPENTER,
L. A. ROBERTS,
C. M. SAXTON,
Committee.

On motion the report was accepted

Mr. Fuller objected to the conclusion of the committee upon No. 7, because it is a pistillate, and, although it is a good berry, he will not send it out, because he thinks it an imposition upon the public to sell plants that will not produce a fruit unless fructified by some other sort, which soon overrun and spoil the bed. This is the trouble with Hovey's and McAvoy's seedlings, which are excellent fruit, and that is the trouble with all pistillates; and it is wrong to sell them when we have so many bisexual sorts of such excellent quality.

HOW SEEDLINGS ARE PRODUCED.

Mr. Fuller then gave the Club an interesting account of his labors in procuring his seedling strawberries. He said:

In attempting to produce a new variety of strawberries from seed, it should first be decided what are the qualities desired, and then, by selecting two varieties that possess these qualities as near as may be, and by fertilizing one with the other, we can come nearer to the object in view than we should by sowing seed collected indiscriminately from varieties not properly fertilized.

For instance, let us take the Wilson, which is very prolific, quite large and firm, but is rather acid, and too dark color, with a calyx that does not part readily from the berry; and the Peabody, which is not prolific, though large, and is of superior color, and sweet, and has a calyx that parts readily.

Now, let us place these two varieties at some distance from other varieties, but in close proximity to each other, so that they can be the more readily operated upon. When they come into bloom we remove the stamens from as many flowers as desired, and then with a fine camel's hair pencil take the pollen from the other variety, and dust it over the pistils of the flower from which the stamens have been removed. It is well to place a fine netting over the plant to be operated upon, to prevent insects from fertilizing it with pollen from inferior varieties.

The flowers should have the pollen applied several times, a few hours between each application, so that the fertilization shall be complete. It is well to use both varieties as parents, and fertilize the Wilson with the Peabody, and vice versa, as it cannot be determined which will produce the best until proved by actual experiment. I do not mention the Wilson and Peabody, believing them to be the best to raise seedlings from, but only to illustrate the principle. From my own experiments with them I have been somewhat disappointed, for nine-tenths of the seedlings from the Wilson, fertilized by the Peabody, were more acid than the parent, although I succeeded in getting the color, and some of the other characteristics of the Peabody; but using the Peabody as the parent, I had better success—getting a better colored berry, sweeter, and some plants that were quite prolific, with almost invariably the long neck, which is a peculiar characteristic of the Peabody.

Among two varieties of the same species, or two distinct species, (unless too far removed, like the Alpine, which I believe will not hybridize with any of the others) may be brought together and valuable varieties grown from the mixture.

But it must be remembered that the varieties now in cultivation have been so mixed and cross fertilized that it is impossible to get a true cross between any two varieties.

The effect of fertilization of previous generations will sometimes show itself when and where least expected. Sometimes the best results will be obtained by merely sowing seeds of any good variety, trusting to its inherent good qualities being transmitted to the offspring.

From the Austin I have got seedlings, all of which resembled the parent, but were inferior; and I have noticed that all of this class, such as the Downer, Iowa, Charlton, Georgia mammoth, &c., are very likely to produce varieties no better than the wild Western berry from which they evidently all originated. It is very easy to get a large variety from this class, but seldom a good one. From the Picton pine I have grown large, sweet, orange-colored fruit, but, like the parent, unproductive.

From the Oscar, which is a poor grower, I have produced fine growers, and those that were moderately prolific; but the fruit was sweet and dry.

The results of some of my experiments are exceedingly curious, such as producing five distinct varieties from the Bartlett, all of which had entire leaves, not lobed. They were very similar to those described by Duchesne as raised by him at Versailles in 1761, and called the Monophylla, it being just 100 years (so far as I have been able to learn) since the first one-leaved strawberry was grown until the second was fruited by me in 1861. But neither were of any value, except as a botanical curiosity.

From the Iowa I produced a five-leaved variety, and one with leaves having a beautiful silver stripe, but of no value to the cultivator.

HOW TO RAISE SEEDLINGS.

When the berries from which we wish to grow seedlings are ripe, they should be marked, and mixed with dry sand so thoroughly that no two seeds shall remain together, putting sufficient sand to absorb all the moisture. Then sow the sand containing the seeds in a bed previously prepared in some half shady place, or under glass, and sift on some find mold, covering the seeds about an eighth of an inch deep. If the soil is kept moist, the plant will begin to appear in about four weeks, and will continue to come up until cold weather; at which time they should be covered lightly with straw, say one inch deep. The plants should be set the following spring, eighteen inches apart, in rows at least two feet apart.

Stop all runners every week throughout the season, and keep the beds clean. The second year after transplanting, you will have fruit. Mark sexes of each as they come into blossom. As the fruit ripens, mark the time and character, and select the very best and destroy all other plants. Lift carefully those that are to be preserved, and put them into new beds where they will have more room to make runners. The correct estimate of the value of any new variety cannot be ascertained until it has fruited two or three years. For my own part, I shall never save a pistillate, although I have done so heretofore extensively, for the purpose of ascertaining by actual experiment whether they were any more likely to be better, or more productive than the bisexual varieties.

The results of some of the largest experiments which I have tried are,

that out of several hundred seedlings of 1856 none were good, although sown from the best seed that I could obtain. In 1859 I raised another large quantity. Being more careful in selecting the varieties and in their fertilization, the result was a thousand different varieties. There were sixty pistillates, one staminate, which produced no fruit, and the remainder bisexual or hermaphrodite.

Out of this number I have three varieties that have fruited three years, that I think worthy of being cultivated. From two hundred seedlings of 1860, fruited two years, I shall keep two for further trial.

To those who may think this a tedious undertaking, I would say that no one should undertake to produce new and improved varieties of fruits and flowers if it is to be looked upon as labor. It should be made a pleasant pastime.

The subject of the day, "Detention Houses and Fruit Rooms," was then taken up.

Prof. Mapes.—The increased demand for pears and other choice fruits necessarily calls for *detention houses* to prevent sudden ripening, *fruit rooms*, etc. It is well understood that the better kinds of pears cannot be ripened on the tree with the best results; the flavor is not developed while growing, and if ripened at later dates they are more juicy; indeed, the sugary portions are not developed for a long time after leaving the tree. Thus a pear which is found to be in its best condition if ripened in January, is very inferior if ripened in November or December, and therefore means are called for to arrest the ripening until the former date. All pomologists agree as to the necessity of keeping pears in the dark after their removal from the trees, until the proper date for their removal to a warm room for maturing, and various modes have been suggested to prevent premature ripening, most of which have proved hurtful to the quality of the fruit. Pears wrapped in paper and then packed in charcoal dust, plaster of Paris, burnt bones, or sawdust, are sure to lose their flavor almost entirely, even when kept at very low temperatures. Washed sand, thoroughly freed from moisture by heat, is among the best substances known for the purpose; but if the sand be not pure, like sea-sand, or should it contain one per cent. of clay, it will certainly abstract some of the flavor from the fruit.

When paper is used, it should not be of the most absorbent kind, for even it will take up the flavor of the fruit. Lemons and oranges, as they come from the Mediterranean, wrapped in paper and packed in boxes, have little flavor as compared with the same fruits otherwise packed. Malaga grapes are often imported in large, unglazed absorbent jars, filled with *baked* sawdust; and if no decay occur to moisten the sawdust, they retain their original flavor; but the slightest moisture robs them of their aroma.

The best place to arrest ripening is a dark room, *fairly ventilated*, and four or five degrees above the freezing point—at a lower temperature, say one or two degrees above the freezing point, the proximate change in the fruit does not occur, and an inferior quality of result is the consequence.

A detention house need not of necessity be an ice-house, but should be supplied with an ice-box placed near the ceiling, constantly supplied with ice, and having an opening to admit a current of air *above the ice;* this will continuously descend into the room as it becomes cold, and no faster, and

the melting of the ice must necessarily be in proportion to the reduction in temperature; if the ice does not continuously melt, the temperature cannot be lowered. From the bottom of this ice-box a tube should convey the water outside the room, which should be at all times dry and well ventilated.

Near the ceiling, in the side of the room, and at the greatest distance from the ice-box, should be an opening to let out the warmer air, which is always ascending and passing away; and this opening should have a cover, so as to regulate the size of the opening for the increase or decrease of ventilation. The room itself should be double in its sides, floor and ceiling, and as *a confined space of air is the best known non-conductor*, it need not be filled in between the inner and outer covering, which should be twelve inches apart. Such a room will maintain an even temperature, not subject to variation; the ice-box should be covered, with a large tube leading outside the building above the ice, which should be placed on a grating near the cover. In the end or side of the ice-box, and near the bottom, should be an opening to permit the cold air to descend into the room; and this opening should be as large as the opening above the ice for the reception of air. This opening should also have a sliding cover, to be worked from the floor of the room by lever or cord, so that when the thermometer below rises above thirty-six degrees it may be opened, or if it fall below it may be closed; between the use of this opening and the exit for heated air the temperature of the room may be steadily maintained. The amount of ice used under this arrangement will be no greater, indeed less, than by depositing fruit in an ordinary ice-house, as in any case the temperature of the fruit can only be lowered at the expense of the ice. No mistake is more common than that of placing ice in the bottom instead of the top of a refrigerator, or room, to be cooled.

Such a detention room may be supplied with shelves, leaving a part of the floor for baskets of fruits, etc. The doors and windows should be double, and the windows darkened, except when light is positively necessary. With such an arrangement pears may be kept, if picked at the proper time and carefully handled, until the proper dates for ripening, and then by removing them to a *ripening closet*, at a temperature of one hundred degrees Fahrenheit, they will ripen in four days or less; and if kept dark during the ripening, the color will be materially improved, often showing a blush, which they will not have if ripened in the light. The catalogues of André Leroy, and other nurserymen, give the proper dates for ripening each kind of pear, and at these dates only should they be removed from the detention room to the ripening closet.

In the large way the grower should sell his pears to the dealer from the detention room at the proper dates for ripening, and the dealer should ripen them in his own fruit closet, presenting them for sale to consumers as ripened.

The *detention room* here described would be invaluable to the growers of fruits generally. Even apples, when treated as above described, are far more juicy and palatable than when treated in the ordinary manner. Small fruits, as picked, should be placed in the detention room, and when reduced in temperature to from thirty-six degrees to forty degrees, they may be carried to market in finer order than as ordinarily treated. Such a room

in the earlier part of the summer may be used as a general refrigerator for butter, meats, etc.; but when used for fruits, all other matters should be excluded; and, above all, it should be kept perfectly clean. Lettuce, radishes, etc., may be kept in such a room for many days in perfect condition.

Subject for the next meeting: "Mode of Constructing Country Houses and their Surroundings."

Adjourned. JOHN W. CHAMBERS, *Secretary.*

July 8, 1862.

Mr. Edward Doughty, of Newark, N. J., in the chair.

Mr. Prince called attention to a flower, the seeds of which he gathered on the Cerro Gordo. On this plant he has found a worm which was similar to the worms found in the same class of plants there, which proves to my mind that every tree and plant spontaneously produces the insects and worms that feed naturally upon that particular plant.

Mr. Robinson asked if the committee on Comstock's Digging Machine were ready to report.

Mr. Carpenter, the chairman of the committee, stated that in consequence of the inclemency of the weather last Wednesday, the committee did not examine the machine in operation until yesterday. The committee will report at the next meeting.

Prof. Mapes.—As the committee will not report to-day, I will make a few remarks on the machine: I was invited to accompany the committee, and was well satisfied at the result. The machine has seven tines on a rod, which was deemed too many. I think two hundred men with forks could not do the work of this machine.

Dr. Trimble.—As one of the committee, I was present at the trial of the machine yesterday. One difficulty in the introduction of the machine is the power required to propel it. I have never seen plowing done by steam, but I think this machine would be an appropriate one to be operated by steam power. I think if the machine was made large enough, one hundred acres might be spaded in a day. The work done yesterday was very good, though the soil where it was tried was a stony, clay loam, and part of it grassy rye stubble.

Mr. Carpenter.—The power required to propel the machine did not seem to me to be more than is required to plow, working the same depth. I think the machine would do the work of five plows.

Mr. Solon Robinson.—We should be careful in our commendation of any new implement. My opinion is that Mr. Comstock will find the greatest objection made by farmers will be, not in the amount of work it will perform, but in the team required. It certainly requires a very strong team, much stronger than it would to plow the same soil eight inches deep, which is the depth the machine works, and ten inches wide, which is about one-third the width of the digger. The question then will be, which prepares the soil the best for a crop, the plow or the digger, and which operation is most expensive? The proprietor of the land, Mr. Vandervere, thought it would not do for the rye stubble, because it left the grass in a condition to

grow. It does not bury it as the plow does. Upon the adjoining land, which had been twice plowed, the digger does disintegrate the surface very finely, leaving it as loose and porous as though worked by the spading fork, when it went twice in the same spot. If the machine was made much lighter, with teeth only four inches long, and used as a substitute for the harrow upon plowed land, it would be a valuable one, and could then be worked by two horses. It cannot now, unless they are very strong, and I do not think it will answer as a substitute for the plow.

Mr. John G. Bergen, of Long Island.—Let us see about that. My soil, it is true, is not quite so heavy as Mr. Vandervere's, but I plow with a pair of horses not as strong as those working the digger, and in stubble or fallow ground I do two acres a day with ease. My plow cuts a furrow-slice ten or twelve inches wide and eight inches deep, and leaves the ground in better condition for planting. Mr. Comstock only claims four and a half or five acres a day for the digger; it is, therefore, extravagant to say that it will do as much as five plows, or as much as two hundred men with spading forks. And I think my plowed ground is in as good condition as it would be after twice working over with the digger. Still, if it can be worked with the same team that is required to plow, at equal speed, it can go twice over the ground at less cost than plowing, because it works three times as wide. I wish to credit the machine with all it can do, and nothing more.

Prof. Mapes.—I do not think that the machine is well enough arranged for working the soil we saw it tried upon. It has too many teeth. That is why it appeared to lift the earth in lumps, which were not broken up by the shaking motion given to the teeth by the peculiar cam action. With fewer teeth it will require less power, and do the work better. I believe that a team that can plow five inches deep can work this machine; which cuts thirty-one inches wide, and loosens the soil five inches outside of the teeth upon each side.

Mr. Bergen thought this a mistake—that it would average less rather than more than the width from one outside tooth to the other. You cannot count upon an average width of over thirty inches. Let us be correct, not extravagant. In the soil where we saw the machine work, once going over stubble will not prepare it fit for a crop. Upon light, sandy land, I believe it would.

Butter and Butter Making.

Solon Robinson read the following letter from Le Roy Whitford, of Harmony, Chautauqua county, N. Y., and earnestly recommended the Club to adopt its suggestions, which it did, in hopes of getting a good deal of information from butter makers and dealers in the country. Mr. W. says:

"I would like to propose for the discussion of the Club, 'The Butter Question.' There may not be a butter-maker among the members of the Club, while it is probable that every one is a consumer. So I ask what is the encouragement for the production of the best butter? The consumers may very properly answer this question. As the business is now done in the country, there is not much inducement to make a first class article. A buyer will take butter of A, B, and C to-day at 18 cents per pound. A's is

A, No. 1 butter, made in accordance with the most approved method. Now, suppose these neighbors meet, and the conversation runs on butter and butter prospects. A says he washes his butter three times, and works it twice after salting with fine dairy salt. B says he used to take pains, but finds it won't pay; he washes it once, and salts it and packs immediately, and gets as good a price for it as his neighbors, besides selling one pound of brine in every ten pounds of butter, which is a difference of from $1.50 and $2 on every one hundred pounds. C says he used common salt, and don't wash it at all if he is going to sell soon after making, and he gets as much as the rest of his neighbors. Now, If Mr. A don't leave off trying to make good butter, it will be because he is a very nice man; and yet this is actually the way butter making goes here to my certain knowledge. Why do our butter dealers show so little discrimination?

Mr. Carpenter contended that the difficulty complained of by Mr. Whitford was occasioned by the agents of those who buy butter to ship to Europe, who do not discriminate as to quality, as those do who sell to city customers, who will pay first price for first rate butter. With shippers, color appears to be more an object than any other quality. He said: Our firm have dealt in butter many years, and nearly every year have had the butter of one particular dairy in Delaware county, N. Y., which always sells high to those who are willing to pay for a good article, and that butter is made by churning sweet milk.

Mr. John G. Bergen.—If there are not butter makers enough among the regular attendants here, if we have the butter question before us we may get some valuable information. There are many persons in the country who can communicate valuable facts, which will be read here and published.

Flowers and Fruits of the Season.

This being a standing question of the Club, was now called up by the Chairman.

Rev. Mr. Weaver exhibited specimens of very fine looking red raspberries, from plants which were sent to him by a nurseryman as Franconia.

Mr. Prince said they were not; that the Franconia has a purple cast in the color. These were not, therefore, true to the name. Mr. W. showed two other sorts which he wished truly named, but no one appeared able to name them.

Mr. Prince made an exhibition of flowers, including several rare ones.

THE FRAGARIA, OR STRAWBERRY FAMILY.

Mr. Wm. R. Prince, of Flushing, L. I.—There was never a period when the culture of the varied fruits of our globe demanded and received so much attention at the hand of man as is everywhere now being devoted thereto, amid the enlightened nations of Europe and America.

It is a most beautiful and sublime truth, pregnant with divine power, wisdom and love, that the fruits and other plants most necessary and conducive to the comfort and the happiness of man, God and nature, in their beneficent and harmonious arrangements, have spread most widely over our globe.

The strawberry is declared to be the most congenial and healthful to the

constitution of man of all the fruits of the earth; and it is often prescribed by physicians for its highly remedial properties, it being never subject to the acetous fermentation. It is for the reason of its combination of excellencies that this fruit has received from the French the appellation of "*L'emblème de bonté parfaite;*" "the emblem of perfect beneficence;" "the most perfect gift of God." In Europe it is found in all the northern and central regions, on the Alps, the Pyrenees and the Caucasian mountains, encircling the confines of eternal snow; and Bayard Taylor found it plenty in Lapland. In Asia, it is found on the mighty range of the Himalaya. In South America it is found from two deg. north latitude to fifty-three deg. south lat., in Surinam, Peru, Chili, Buenos Ayres and Patagonia. In North America it is found from fifteen deg. to sixty-seven deg. north lat. in Mexico and in all of the United States; along the shores of the Pacific up to and including the Russian Possessions, in all the British Provinces, including Newfoundland, Labrador and Hudson's Bay, up to the regions of the Arctic Circle. Sir John Leslie states that he found it growing in matchless profusion on the borders of the Arctic Zone. A correspondent, who dates his letter from the Russian Possessions, north of Lake Athabasco, sixty deg. north latitude, writes me: "There are plenty of wild strawberries, and good ones too." It is the only edible fruit found in the torrid, temperate and frigid zones, a fact hitherto entirely ignored by all European and American writers, who have invariably stated it to be a native of the temperate zones only.

I have gathered fruits from the plants of nineteen of our States, and have found it plentiful in both the Canadas; and I well remember when rambling along the banks of the St. Lawrence, below Quebec, the merry peal of children who, with their tiny baskets, were crying "wild strawberries!" around the falls of Montmorency.

I have wandered along the shores of the Pacific and plucked the bright berries of the Fragaria lucida, whose tendrils overhang its banks. I have rambled among multitudes of the vines bordering the shores of the bay of San Francisco; and the first sound that greeted my ear, when entering the plaza of that city, was women crying California strawberries. These coral berries have regaled me on the Mexican Cordillera; and their tiny tendrils pendantly bordering the roads of lava, greeted us with their spicy aroma when traversing the vast volcanic mountains of Jalapa.

It will thus be seen that the little Fragaria or strawberry plant expands its domain over a vast area of our globe. It enriches the central tropical regions of Surinam and Peru, extending its southern domain to the remotest border of Patagonia. It extends its fibrous tendrils over both the temperate zones, and even into the frigid realms of the Arctic Circle, and spreads its verdant mantle as the last edible fruit approaching to the polar regions.

The attributes of God and nature are wisdom and love; and as all emanations must partake and represent their source, it thence follows, as a consequence, that every object of creation, whether great or diminutive, is ushered into existence for a wise and beneficent purpose. It also follows that every condition attached to each object of creation is good, wise and necessary to consummate the great purpose intended.

If it were better that any tree or plant should, on account of climate or

other circumstances, possess bisexual flowers only, such would most certainly be the character which God and nature would impart to it. On the other hand, if it were more favorable to its development that the flowers should be unisexual, that is, male and female, such would most assuredly be its character; and these two distinct sexes would furthermore be placed on the same plant, or on distinct plants, accordingly as such conditions should be most conducive to the full development of its seed and fruit. I wish further that it should be distinctly understood that there is no waste of even an atom of matter throughout the mighty universe, and to assure you of this most important fact, that nature never gives or withholds any quality or condition without a purpose, and that the means imparted are always in a precise ratio to the object to be attained. There are upon our globe 4,200 genera, and 40,000 species of plants which have been described by different authors. Of the 4,200 genera there are only 160 which have male and female flowers distinct, but growing on the same tree or plant; and 180 that have the male and female flowers growing on distinct trees or plants, whereas there are 3,960 genera, and 37,700 species which produce bisexual or hermaphrodite flowers; that is, the male and female organs united in each flower, thus showing an immense preponderance in this latter class of plants.

As a general rule the character of each genus pervades all the species belonging to it; but, to the amazement of the botanist, we find the Fragaria or strawberry family to be an extraordinary exception, for although comprising but twelve species, we find these to combine three classes: Icosandria, with bisexual flowers; Monæcia, with male and female flowers on the same plant; Diœcia, with male and female flowers on distinct plants.

Such being the normal and primitive condition of the Fragaria, we very reasonably ask—*Cui bono*?—for what good purpose has nature imparted the variations in the sexual character of plants? I answer that, as nature does nothing without a purpose, these variations of character are in all probability a relative connection with the fact that the strawberry is found from 53 deg. south to 70 deg. north latitude, thus covering 123 deg. and probably more of our globe, and is the only edible fruit found profusely spread over all the zones of the earth. These various distinctions of character may be, and most probably are, indispensably requisite for its successful fruition in these diversified locations. I attain to this conclusion from two other astounding facts: first, that these distinctions are normal and climatic—that is, the distinct characteristics are developed in distinct countries; and secondly, that they are permanent and unchangeable, and that there is no hybridization between the distinct sections, thus indicating that the normal condition of each species is alone applicable to its perfect development in its own congenial sphere.

The European spécies are hermaphrodite or bisexual, with the exception of the Fragaria elatúr (Hautbois), which combines the three sexual divisions—male, female and hermaphrodite; and this last species alone inhabits the low lands, whilst the other species are found only in the mountains and high lands, These European species are the following, and they all, in their natural state, produce fruit of small size:

Fragaria vesca.—The Wood and Alpine strawberries.

Fragaria Collina.—The green Pineapple strawberry.

Fragaria elatior.—The Hautbois strawberry.

Asia presents us with but one species, hermaphrodite, *Fragaria Indica,* with yellow blossoms, fruit not edible.

South America possesses two species, both of which have large foliage and flowers, with fruit of remarkable size and excellent flavor. The flowers comprise two sexual divisions.

Fragaria grandiflora.—The Pine strawberry.

Fragaria Chilensis.—The Chili strawberry.

North America affords us six species, thus demonstrating her great superiority in regard to the Fragaria as she does in regard to the Vitis or grape family. These species are very distinct in character from all the European and South American species, and produce fruit varying from a medium to a very large size. All these species are originally of the same sexual character, and distinct in this respect from all the other species of our globe. Each species comprises plants of two distinct natural characters: first, hermaphrodite or bisexual; second, pistillate or female. Plants of these two divisions may be found in every forest, from the northern limits of Mexico to the Arctic zone. Of the hermaphrodite section there are two natural divisions: the one combining the stamens and pistils in the same flower; the other producing some peduncles of entirely bisexual, and others of entirely pistillate flowers. The North American species are:

Fragaria Virginiana vel Canadensis.—Scarlet strawberry.

Fragaria Hudsonica.—Hudson's Bay or Arctic strawberry.

Fragaria Iowensis.—Iowa strawberry.

Fragaria Illinoiensis.—Illinois strawberry

Fragaria lucida.—California strawberry.

Fragaria sericea, of Douglass. }
Fragaria Chilensis, of Torrey and Grey. } Oregon strawberry.

It is a most striking evidence of the universal providence of nature that, when in any of the Fragaria species the male organs of the hermaphrodite variety are imperfect, nature, ever provident, furnishes the male or staminate variety to supply the deficiency; and when, in any species, the female organs of the hermaphrodite are defective, nature presents us with the pistillate or female variety. But when any species like the Fragaria vesca, Collina and Indica are perfect in both organs, throughout all their varieties, nature, ever economical of her resources, gives us none other than hermaphrodites. *The fish in the subterranean lake of Kentucky have no eyes!*

Most persons suppose that all strawberries will hybridize with each other, and there has been no European or American writer on this subject who has not inculcated this erroneous idea until I controverted the fiction in toto in the *Horticulturist*, of January last. The facts there stated I had very long since recognized, but had not previously found time and a suitable opportunity to enunciate. It is now two hundred and fifty years since the first interchange of European and American strawberries, and during this entire period there has never been produced a single hybrid between the species of the two hemispheres, nor between the three species which are natives of Europe.

The six North American species blend sexually with each other, and the

two South American species blend sexually with each other, but these two sections present an inherent aversion to any hybridization with those of the eastern hemisphere. Messrs. Hovey, of Boston, attempted such hybridizations twenty-eight years ago; Prof. Huntsman and myself have tested them for a similar period, and neither could succeed. No such hybridized seedlings have been presented in America, in France, or in England; and all pretences of producing any such hybrids now are delusive notions, arising from an ignorance of normal conditions.

As like produces like in the vegetable as well as in the animal kingdom, it is indispensable that seeds for the purpose of originating new varieties should be obtained by congenial hybridization of the existing varieties possessing the greatest number of good points.

The characteristics of the six North American species are acidity and great productiveness; and the characteristics of the Fragaria grandiflora and Chilensis of South America are large size, sweetness and perfume. Of the one hundred and twenty selected varieties of the Fragaria Virginiana, Iowensis and other North American species now under culture in our grounds, there are but about twenty-five which have sweetness predominant, and only fifteen which have perfume or aroma; and these are the best selections from thousands of seedlings during the last thirty years. No seeds should be planted but of such varieties as possess these qualities, and such as are also of large size and brilliant in color. A sour berry like the Wilson, Austin and Chorlton will produce nearly all sour berried seedlings. In proof that the same course of breeding by selection appertains to plants as to animals, I will make mention of two striking facts. I have, during the present season, had above five hundred seedling plants which have fruited for the first time; among these there were ten plants grown from a high bred seedling, which Prof. Huntsman calls "American Queen;" of these ten, but five produced ordinary fruit, and four of the others are the largest and finest flavored out of the sixty-two selected varieties from my entire collection of five hundred seedlings. I had also thirteen seedlings of the Austin—a large, handsome, but acid and inferior berry; of these only one was equal to its beautiful, but soft and insipid parent. The others were devoid of all sweetness and perfume, and utterly worthless. Among the seedlings announced to the public the present season, there are nine offered by Messrs. Burgess, Fuller and Russell, grown from seeds of the Wilson and Austin, and all are acid but one, and that is a small, semi-acid berry. It becomes us to be fastidious as to fruits and flowers possessing perfume, *as they are by nature constituted the most perfect;* and my own floral pursuits have taught me to realize *the sublime truth* that the aroma of the fruits of the earth, and the diversified perfumes of the myriads of flowers which adorn every mountain and every valley, constitute the incense which the vegetable kingdom offers spontaneously to its God.

I have already stated that Prof. Huntsman and myself have been engaged in growing strawberries from seeds for about thirty years, and we have probably so grown in all fifty thousand plants, selecting always the choicest for cultivation, and casting these aside as we chanced to obtain varieties of increased merit. The collection we now possess, all the varieties of which are methodically arranged by name in my grounds, comprises

eighty-five foreign and one hundred and seventy American varieties, besides more than a thousand seedlings, whose merits are yet to be tested. Two hundred of these varieties are described in our present catalogue, and also in the Agricultural Patent Office Report; and I may here assert, without a possibility of contradiction, that the collection thus concentrated is superior to all the European collections combined. I do hope that this accumulation of the Fragaria family may be perpetuated, and so soon as we shall have a National Pomological Institute, for the culture of all the varieties of fruits, I shall present my entire collection thereto for the purpose of an universal free distribution.

Of the twelve species of the Fragaria family found upon our globe, nine of the species combine plants possessing two sexual divisions, and three only produce what by some are termed perfect flowers, that is, combining both sexual organs in each flower.

All the six North American species, throughout their innumerable varieties, comprise the two sexual varieties: first, bisexual or hermaphrodite plants; second, pistillate or female plants; and no male plant has ever been found native in North America. A quondam writer has stated that no pistillate or female strawberry is found in a natural state, but that they are garden monstrosities. So ignorant an assumption is scarcely worthy of contradiction, when every forest proves the contrary. I will here simply remark, that if a pistillate plant is an abortion or lusus naturæ, then God and nature have most unaccountably failed in the formation of the different species of the Fragaria, as nine out of the twelve species of strawberries that exist upon our globe combine plants with two sexual divisions, and there remain consequently but three species, where nature was *true to herself;* and these three alone would present the form and character which it is claimed that nature had designed, thus rendering Providence chargeable with a failure. It would also be a most surprising fact that at this late day we should make a discovery which has escaped all previous observers; that the only anomaly or defect in the vegetable kingdom, comprising, as it does, above forty thousand species, existed in the little family of the Fragaria or strawberry plant.

> "Go, wiser thou! and in thy scale of sense
> Weigh thy opinions against Providence.
> Call imperfection what thou deemest such,
> Say here he gives too little, there too much."

If any person has credited some statement adverse to the existence of natural pistillates, let him spend fifteen minutes in some forest in the flowering season, and he can satisfy his doubts, as there is not one spot in all North America, from the tropics to the frigid zone, nor between the Atlantic and Pacific oceans, where the pistillate plant may not be found growing with its hermaphrodite congener. I have been familiar with their existence in all our forests, from boyhood, and they abound in the numerous woods and prairies of Long Island. I have found them in all the Eastern and Middle States, in some of the Southern, and in most of the Western States. They abound, too, in our vast western prairies. I have also obtained both sexual divisions from Oregon, Hudson's Bay, and the Arctic regions, and both sexual divisions are regularly produced from

seeds, the one or the other preponderating, according to the character of the seed sown. Downing, Wm. Prince, Longworth, Thomas, Hovey, Elliott and Hooper, in their works, and Dr. J. H. Bayne, and all other cultivators who have examined the wild strawberries of our country, have found the same two sexual varieties, and no man who will use his eyes can deny so universal and so evident a fact. At the present time these sexual distinctions form the basis of the strawberry culture of America, and Europe will be compelled to adopt the same course.

AMERICAN STRAWBERRY FARMS.

As the growing of this healthful and delicious fruit is now attaining a very extensive development, it would appear to be an object of primary importance that we should ascertain who are the most extensive and successful growers of this fruit, and also as to what the great success of the most eminent is to be attributed. Whether it is to be accounted for by a superior mode of culture and system of manuring; to the judicious selection of appropriate varieties; or to the scientific sexual combination of staminates, hermaphrodites and pistillates; or to the adoption of some two, or perhaps of all these means, for insuring the most advantageous results, it would appear that the largest area of ground appropriated to the growing of strawberries in any of the States, is comprised in the strawberry farms of Maryland, New York, Ohio and Kentucky, and next to these, New Jersey, Massachusetts and Pennsylvania, and the aggregate portion of land so appropriated in each State is in the same ratio in which I have named these States. In Maryland, in the single county of Anne Arundel, there are 680 acres devoted to the culture of strawberries. Two of the largest growers, Rezin Hammond and Joseph M. Bryan, have each about 120 acres, and the daily average that each has sent to market for the last two years, during the fruiting season, has been about 12,000 quarts per day, and Mr. Hammond received from an agent who attended to the sale of most of his crop for one season, $10,000. The other leading growers have from ninety acres down to 25 acres; besides which there are very many small growers who have from two to ten acres. In the vicinity of Washington city there are eight or ten extensive strawberry plantations. One of the most extensive is that of Dr. John H. Bayne, who has devoted his attention to this culture for more than twenty years. In Pennsylvania there are some considerable plantations, but the great market of Philadelphia derives a large portion of its supplies from Maryland and New Jersey. A. L. Fetton, and Mr. Knox, of Pittsburg, have devoted their attention to strawberry culture. The latter began most ardently with the Wilson, but after trial cast it out and adopted the Triomphe de Gand, which cannot fail to prove even a greater failure than the former. In New Jersey we have a host of not less than sixty growers, and among the most important we have Wm. Parry, John Mitchell, Clayton Lippincott, W. R. and Jacob Shediker, B. J. Lord, etc. In the vicinity of Keyport there are more than thirty growers, and they send the most of their crop to the New York market. In the State of New York there are a vast number of growers located in the counties which border the Hudson river, and throughout the western section of the State, and very many on Long Island. In the vicinity of

Cincinnati, Ohio, there are many extensive strawberry farms, and there are others still more extensive on the Kentucky side of the river, who send their berries to the Cincinnati market. Two of these growers have each 150 acres in strawberries, and have each sent four to five thousand bushels to market in a season. In Massachusetts there are a great number of strawberry growers, who are mostly located at Belmont, West Cambridge, Brighton and Chicopee, who furnish great supplies for Boston and other cities. They cultivate only a few leading varieties, and grow the Hovey with great success, which may be done anywhere by selecting a suitable staminate. In Illinois there are many extensive growers in the vicinity of Chicago, at Centralia, Cobden, Tonti and other localities. Our western States abound with strawberries in their woods and prairies, and of course they present congenial locations for the cultivated varieties. When the culture of the strawberry is becoming so wide-spread, it is astonishing what a diversity of opinions exist as to the meritorious varieties, and their adaptation to the respective localities. Opinions are adopted and expressed without sufficient scrutiny, and varieties become all the rage in some localities, which have just been exploded and rejected elsewhere. The experience of the first growers of any variety seems to be entirely ignored by the second recipients, until they pass through the same school of experimenting and failure. A prejudiced opinion, emanating from an ignoramus, is adopted without scrutiny, and passes equally current with those which are based on scientific facts, and consequently many years are lost by useless experiments, which result in failures that might have been avoided by previous inquiry.

In Maryland, and in this State, where the largest and most successful plantations exist, the varieties mostly grown for market are: the earliest Jenny Lind, moderate crop; Bayne's Early Scarlet and Welcome, the first named being gradually abandoned; the next in succession, Baltimore Scarlet, Eclipse, Sultana, and Triumvirate; the next, as main crop, Scarlet Magnate, Stewart, Diadem, Suprema, Hovey and Sempronia; and these Pine varieties, La Constante, Lucas, Lennig's White Pineapple, and Tucunda, which are far superior to Triomphe de Gand in flavor and crop; and for the latest crop, Prince's Late Globe, a heavy bearing scarlet. The Wilson, Austin and Downer are rejected as too sour, or too soft for market, Fillmore as insipid, and Triomphe de Gand as a poor bearer and not sweet. The varieties above recommended are for market. There are other exquisite varieties of the Pine family, which being yet scarce and high priced, will only be purchased by amateurs. They comprise the very climax to which the strawberry has attained. It was in reference to the delicious sweetness and exquisite aroma of this class of strawberries that the Rev. Sidney Smith is reported to have made the comprehensive remark that "doubtless God *could* have made a better berry, but doubtless he never *did*."

The following comprises some of the largest, most beautiful and most delicious varieties: Delice du Palais, Comtesse de Beaumont, Duke of Cambridge, Auguste Rietmeyer, Emma, Empress Eugenie, Frogmore Late Pine, Garibaldi, Robert Trail, Lorio, Orb, Ornement des Tables, Royale Victoria, Beauty of England, Mrs. Neilson, Margueritte, Prince Arthur, Scarlet Rock, Prince Imperial, and others.

Of the American Scarlet and Iowa families, the following are also new and rare, and cannot at present be obtained at a moderate price, so as to be introduced into field culture for market, as they will be when they become more plentiful; Eureka and Princess, the two best; American Queen, Angelique, Augustine, Benicea, Beatrice, Bersilla, Ernestine, Eugene, Excelsa, Fontenelle, Fortunatus, Heroine, Lawrencea, Pauline, Melanie, Prince's Large Climax and Scarlet Excelsior, Rosina, and others.

The only other classes of strawberries worthy of special notice are the Hautbois family, the best of which are Belle Bordelaise, Bijou des Fraises, and the Monstrous berried; the European Wood family, of which the Green Pineapple and Bargemon are the most delicious and aromatic; and the Alpine Everbearing family, the best of which are Reine des Quatre Saisons, Poiteau, Gloire du Nord, and Versailles. When judiciously cultivated, the different families will form a continuous chain of fruit-bearing varieties, from the beginning of June until vegetation is arrested by the frosts of autumn.

In an analysis of the species and different varieties of strawberries which are now grown on the market farms throughout the Union, we arrive at the remarkable fact, that these plantations, which were originally commenced with the Early Scarlet and other varieties of the Virginiana family, have become gradually changed by the adoption of other varieties, and that at the present time fully three-fourths of the entire area occupied by the strawberry culture is comprised of varieties of the Iowa species or family. These are not only more hardy, robust and vigorous than the varieties of the Virginiana family, but the berries of most of the varieties are much larger, as well as more beautiful and attractive. The crop is also greater and more permanent and reliable. All these are highly important points to the market grower. This is the only species of the Fragaria family whose predominating color is orange-scarlet.

The varieties which have now become most prominent in field culture are, first, the original Iowa, called Washington, at Cincinnati, hermaphrodite, with large, vigorous foliage, and large flowers. This produces a fair crop of large, early-ripening berries; second, the seedling hermaphrodites, and more especially the pistillate varieties which have been produced from this parentage. The best of these are the Diadem, Stewart, Suprema, Triumphant Scarlet, Seraphine, Triumvirate, Victorine, Coppock, Prince's Late Globe, Globose Scarlet, Longworth's Prolific, and Melanie. The Austin, Chorlton, and Russell's are of this family, the two first of which are too acid and soft, and the third apparently defective in several points requisite for a market berry, but has yet to be fully tested. In Iowa and other western States where this species is found in a state of nature, the latitude is not so high as some other regions where strawberries are found, but the winter cold is so intense that the mercury sinks as low as in some more northern latitudes.

The Hovey strawberry is generally cultivated with success; but at the recent Pomological Convention there were some who stated they could not succeed with the Hovey, and it seemed very obvious they did not understand its proper culture. At Belmont and West Cambridge, Mass., where they are so eminently successful, they rely on but one crop. They

set the plants in the spring of one year, and they rely on a good crop the second year; after which they replant the ground. They are also very scrupulous in their selection of an appropriate fertilizer.

We have witnessed the utterance of a good deal of nonsense against the culture of pistillate varieties, as the attendants of hermaphrodites is then necessitated; but as the latter also yield their crops, there ensues no waste of ground. The assemblage of several varieties in adjacent plots or fields is also a positive advantage, as in such case, if one fertilizer is not congenial, and does not blossom at the same period, the pollen is supplied by some other that is efficacious. The fallacious idea that great inconveniences must arise from the plants of different varieties running together on the borders of the beds has no application to field crops, and is only important to a nursery of plants grown for sale, where the precise accuracy of every plant is indispensably necessary. But no close proximity is required; for if the beds are planted within one or two hundred feet of each other, nature will ever perform her duty, and the fructifying pollen will, without the aid of winds or bees, be wafted to the female blossoms, conveyed thereto by the electrical influence of sexual-magnetic attraction!

LOCALITIES WHERE THE STRAWBERRY IS FOUND GROWING IN ITS NATURAL STATE.

Every State in the American Union	26° to 49°,	north latitude.
Surinam	2° to 6°	do
Mexico	15° to 33°	do
Texas	26° to 36°	do
Missouri	36° to 40°	do
Illinois and Indiana	37° to 42°	do
Iowa	40° to 43½°	do
Wisconsin	42½° to 47°	do
Minnesota	43° to 49°	do
California, Oregon, and Washington territory	32° to 49°	do
Vancouver's Island and Puget Sound	50°	do
Canada East and West	42° to 52°	do
Newfoundland	46° to 51°	do
Hudson's Bay	51° to 64°	do
Labrador	54° to 64°	do
Arctic region	64°	do
Lake Athabasca and Russian Possessions	60°	do
Peru	3° to 21°,	south latitude.
Chili	25° to 42°	do
Conception, Chili	36°	do
Buenos Ayres	34°	do
Patagonia, south to Magellan	38° to 52°	do
Europe, Northern, Middle and Alpine regions	45° to 68°,	north latitude.
Lapland	64° to 68°	do
Pyrenees	38° to 43°	do
Alps	44° to 48°	do
Caucassian Mountains	44° to 44½°	do
Himalaya Mountains	28° to 35°	do

STRAWBERRIES FROM SEED.

Mr. Wm. R. Prince.—If strawberry seed is sown as soon as ripe, you may get new plants in fifteen days. The right depth to cover strawberry or any other seed is its diameter. Seeds for propagation should be selected very carefully from the best sorts.

Mr. C. Bemon, Belfast, Maine, writes:

"I am much interested in the discussions of the Club, especially in regard to strawberry cultivation, and have been very much profited by many useful hints, gathered from these discussions. We have been quite successful

in cultivating the strawberry here—'till this year we have met a foul destroyer, which, if no remedy is found to prevent its ravages, will prove fatal to strawberry culture in this section.

"This enemy is a borer, like the apple borer, about half an inch long, and goes into the heart of the root of the plant, working its way through, making a hole and dust like the apple borer. We noticed its effects first after the fruit was set, which promised a good crop, but the plant withered and dried up.

"As the strawberry question is now under discussion in the Club, I forward this information, and would inquire if they can suggest a remedy to destroy this pest, and save our strawberries."

No one present had met this pest or could suggest a remedy.

Mr. John G. Bergen said that thirty or forty years ago his father had to abandon the cultivation of strawberries on account of a black worm that destroyed the roots. Whether it and the one in Maine are identical is uncertain.

Adjourned. JOHN W. CHAMBERS, *Secretary.*

July 15, 1862.

Mr. Edward Doughty, of New Jersey, in the chair.

New Road Laws.

Mr. Benjamin Clark, of Darien, N. Y., sends the following communication:

"Presuming the members of the Club would like to hear a word or two how the new law works in Western New York, I would say, among the loyal farmers it works well, but not quite as well with the lawless and disobedient.

"After fencing half round my farm some forty years, to make a road pasture for other people to keep their cattle, till my fence timber is about used up, I saw by the new road laws that it was made 'unlawful for any cattle, horses, sheep or swine to roam at large in any public highway in this State.' Comparing this with the Prophet (Ezek., 38), where it is said the Lord's people shall 'dwell safely'—'all of their dwellings without walls, and having neither bars nor gates.' Accordingly, the 1st of May, 1862, I set open my gates, and moved a part of my road fence, opening to the highway all my fields, meadow and garden, day and night, to this day, with the greatest possible safety, feeling more secure than when the road was filled up with farm stock; and I had rather summer a poor man's cow or two for nothing, and give him the grass in the road to winter his cow on, than to be compelled to make so much road pasture without fence timber.

"I would respectfully suggest, that if all loyal farmers will open their gates and bars to the road, or move so much of their road fence as will convince passengers that the road is not to be used any more as a pasture, very soon farm stock will disappear from running at large in the highways of the Empire State."

Prof. Nash.—I want to say a word upon the matter discussed a week or

two since, when the subject of this excellent law was before the Club, about the idea suggested that every landowner should plant fruit trees along the road side. It should be kept continually before the eyes of the people. Let this Club do all it can to produce such a blessed result. I insist that landowners are in some measure under obligations to the landless to bestow this boon upon them. Every one should try to make the roads more beautiful along his premises. The Indians are surprised at our land monopoly. They say that the Great Spirit gave it to all, and that no one has right to any more land than he needs to grow crops. I have known farmers to dump all the stones found on their farms on the road side, and have seen old stumps of trees lay there for years.

The Grain Aphis.

Mr. Solon Robinson.—The grain aphis is creating much alarm throughout the country, and is doubtless doing some damage. I have received a number of letters inclosing heads of wheat covered with this insect.

Mr. John J. Carter, of Upper Oxford, Chester county, Pa., says it was very plenty last year upon oats, and appeared to retard the ripening somewhat, but did no serious injury. This year it is very thick upon the wheat, and many have found that it will be much injured:

"If your American Institute Club could devise some practicable plan by which farmers could wage an efficient warfare against all injurious worms and insects, you would be doing the country a great service. Chester county this year, I think, will have her corn crop reduced one-fourth by the cut-worm alone, and wheat nearly in the same proportion by the fly, to say nothing of the destruction of grapes and cherries by the rose bugs, and of other fruits by the curculio. This would evidently pay for a good deal of legislation, even at the present exorbitant rates at which laws are now usually obtained. We have legislation for the suppression of noxious weeds, of contagious cattle disease, of stock running at large on the highways, &c.; yet all, taken together, are not near so important to the farmer as the destruction of worms and insects. If an increase of insectiverous birds be an advantage, can't we have them protected at all seasons? Can we encourage the propagation in any other way? Or is there any other means by which united effort may be brought to bear to check the ravages of insects? When farmers lose one-third of their crops year after year, as many do, it is no wonder this is becoming an interesting question; yea more, a question of life and death."

Mr. H. B. Norton, of East Elba, Genesee county, N. Y., says these insects threaten to destroy all crops in that section, they are so abundant.

Several other letters from other places make the same statements.

The *Rural New Yorker*, in answer to inquiries, says:

"The insects received with the above, clustered on a head of wheat, are the grain aphis (*Aphis Avenæ.* of Curtis). They were very numerous in sections of this State, as well as at the East last season, infesting the wheat and oats, and doing much injury to the grain by sucking the juices needed for the perfection of the seed. In an excursion among the wheat fields in the vicinity of Rochester, a few days since, we failed to find the aphis, though it is not at all likely that the farmers of this State will escape."

Curtis gives the following description:

"*A. granaria* (wheat plant louse) inhabits corn crops, having been observed upon barley and oats, as well as upon wheat. In July and August it is sometimes abundant on the ears of wheat, sucking the stem and impoverishing the grain. The male is green; horns very long and black; eyes and three ocelli black; disc of trunk dark; tubes slender, longish and black; nervures of wings pale brown; terminal cell semi-heart shaped; stigma long and green; hinder legs very long; thighs (excepting the base), tips of shanks, and feet, black. Female often apterous (wingless), dull orange; horns, excepting the base, eyes and abdominal tubes (which are stouter than in the winged specimens), black; legs blackish, anterior thighs, and base of tibiæ, more or less ochreous. Numbers of the apterous females are often seen dead, and of a tawny or black color, upon the ears of wheat, having been punctured by a parasite fly, named *Aphidius avenæ*, which escapes when it hatches, by forcing open a lid at the end or side of the body. *Ephredrus plagiator* is a similar parasite, bred from the dead females, which turn black when punctured.

"We do not know that any means have been devised for destroying this aphis. Smoking, which proves effectual with many of the aphis family, would be out of the question in the field. Slaked lime in a powder has been recommended for dusting the wheat heads, as also chloride of lime."

Mr. Wm. S. Carpenter.—The aphis first appeared and attacked my spring wheat last year. One of my neighbors had a field of wheat; every head of the grain seemed to be covered with this insect, and the owner thought it was ruined, but it yielded twenty-five bushels an acre. All crops in my neighborhood are now infested, but farmers are not as much alarmed as they were last year.

Buggy Peas.

Mr. George Soule, of Warren, Ohio, wants to know how to kill the bugs in seed peas.

Mr. George H. Hite, of Morrisania, said that his practice was to pour boiling water over them, which cleared them of bugs. The peas were plenty the following spring, and they grew very well.

Sugar in Wine.

Mr. Solon Robinson read a letter from Mr. C. S. Middlebrook, in relation to this subject:

"I have read the remarks you made at the Farmers' Club, in June last. From them I understand you object to calling anything wine that has had cane sugar added, while you approve of the addition of sugar to the grape by cultivation. Prof. Mapes objects to the prize being offered for the best wine unless he can be assured it has no cane sugar. If he cannot discover its presence, and the wine is made better by it, what is it but prejudice that causes his objection? Will you, in justice to the other side of the question, give the inclosed remarks of Liebig as prominent a place as you have your own opinion? I have made domestic wines eighteen years, and fully believe in Liebig. Either Liebig or you must be mistaken. At our

grape convention in Connecticut, I have heard men who have had the name of being scientific, say you might just as well add rum to grape juice as cane sugar. Every practical man knows better. I have seen them after all their talk pronounce my sparkling wines the best, when they knew they had additional sugar. At the time I did not know that Liebig had expressed a different opinion; and knowing from experience that my own opinion would not be of any worth to them, did not offer any. Liebig says: 'It may therefore be easily understood that we can exercise a most decided influence upon the quality of the juice of the grape by our manner of cultivation — by a judicious choice of manure. We may rationally improve a must rich in ferment (i. e., blood constituents) by the addition of sugar, and it is a matter of perfect indifference that this sugar has been produced in the organism of some other species of plant; or we may add to the expressed juice of our unripe grapes the dried grapes of southern climes. In a scientific point of view, there are real improvements which have nothing in them very recondite, very difficult of comprehension, or objectionable.' Do you not have, sometimes, too much theory? As in your strawberry question, one says staminate plants grow the best berries, and another, pistillate varieties. Both are good, and both are strawberries, no matter whether sour or sweet. Would it not be just as right for Mr. Prince to call your sour seedlings sour krout, as for you to pronounce all wines that are sweetened with cane sugar, swill. I'll lay you and Professor Mapes a bottle of my best wine that you both prefer champagne to claret, and leave you to answer."

Mr. Robinson.—To this last proposition I most distinctly assert that Mr. Middlebrook is mistaken—that I do not prefer champagne to claret. I do prefer any sound wine, however sour, for instance Mottier's Cincinnati "still wine," to any sparkling wine I ever saw, and that, or claret, or Rhine wine, is preferable to any sweetened stuff ever made. The pure wine is healthy; the sweetened wine is not. The pure wine is very slightly intoxicating; the sugar added to wine is converted into alcohol, and makes it decidedly intoxicating, and liable to produce headache and biliousness. That is why I object to using sugar and grape juice together. If we cannot produce grapes that will make wine without sugar, let us relinquish the attempt to make this a wine producing country. It is only a vitiated taste that prefers sweetened wine. It is a taste that I do not prefer to cultivate. I wish to elevate American wine above slops, and correct the taste so that people will enjoy the pure juice of the grape.

Prof. Nash.—Dr. Underhill contends that the cane sugar that he adds to his grape juice is converted into grape sugar by the action of the grapes upon it in the course of fermentation, so that the wine is just as good as it would be if the sugar was produced in the grapes. How is this?

Mr. Solon Robinson said that Dr. Underhill, and all other manufacturers of beverages called wine, are like all other manufacturers. They make what will sell. If the bad taste of customers requires a sweet drink that will produce headaches and intoxication, the manufacturers will furnish it. Cane sugar in fruit juice does not change its whole character and become grape sugar. It does make rum by fermentation without undergoing any unnatural change. The public buy and use such wine because they do not

know that pure grape juice, if the grapes are ripe and properly manufactured, makes better wine without than with sugar. Let us do our duty and state the truth upon all occasions, without fearing that it may offend those who make a profit by dissolving cane sugar in water and fruit juice, and selling it as wine.

Currants upon Single Canes.

Mr. Geo. H. Hite, of Morrisania, made a fine exhibition of currants, principally red and white Dutch, grown by his plan of pruning to single canes, and training to a trellis like grape vines. These canes are six or seven feet long, and are covered with fruit from top to bottom. In contrast are some bushes of the same variety, grown by Michael Simmons, of New Jersey, in the old style, with branching limbs well loaded with fruit, but nothing like those of Mr. Hite, nor could an acre produce as great a quantity—probably not more than one-half.

Mr. Hite also shows some remarkably good gooseberries, grown by a system of open culture; that is, keeping the bushes pruned so as to allow a free circulation of air through the heads.

Mr. John G. Bergen.—I have some very fine currants growing upon bushes not pruned to single canes; yet I believe the system a good one, and I believe that the old red Dutch variety, well cultivated, is equally productive as the cherry currant, and of better quality in my sandy soil.

Mr. Wm. S. Carpenter.—I have grown several varieties of currants for the past few years. The white grape currant I find very fine; also the white Provence is a very large and superior currant, and I remark that the difference between the Cherry currant and the Versailles is so slight that it is not worth while for any person who has the one to get the other.

Mr. Carpenter, from the committee appointed to examine the digging or spading machine of Mr. C. Comstock, made the following report:

Your committee visited the farm of Mr. Vanderveer, at Flatbush, L. I., July 17th, and witnessed the performance of the machine. It has long been acknowledged that soils after being thoroughly spaded, or forked, were in better tilth than when simply plowed, the disintegration being more thorough, and the admixture of the parts more complete. The aim of the present machine is to retain all the advantages consequent upon *hand forking*, combined with the superior strength of horse power, producing more perfect work, and to a greater depth than by hand power, and with an increase of speed and consequent lessening of expense.

DESCRIPTION OF THE MACHINE.

Two plates are attached to the two ends of a shaft, circular in form, and containing twelve slats, entering from their periphery, for the reception of twelve rods, armed with seven spades or fork blades each. The rods and spades have an independent and automatic action; so that, by the assistance of a cam and friction rollers, they alternate the position of the spades in such a manner as to permit each line of spades to travel in the form of a cycloid, entering the soil in front to the depth of eight inches, each line of spades entering progressively in advance six inches of each other, and, after entering, the peculiar form of the comb, the rollers change the line of

travel so as to carry them backward, at the same time lifting the soil, which, while held on the spade blades, is shaken to insure its disintegration.

WORKING OF THE MACHINE.

The ground selected for the experiment was a piece of rye stubble and potato ground, the potatoes having been dug; the soil a clay loam. The rye stubble contained much grass, and the soil very compact. In the stubble, the machine dug the ground about three feet wide and from five to eight inches deep, displacing all the soil, but failing to pulverize it, so as to leave it in good tilth. It was then tried on the potato plot; here it worked to the depth of eight inches, and left the soil in much better condition. A second time going over with the digger demonstrated that the principle, as applied to this implement, is a correct one; for in no implement now in general use can the soil be so thoroughly mellowed to the depth to which it is disturbed. It is calculated to do for the field what the spading fork does for the garden.

The power required to operate this digger is an objection; although the above experiments were made with a pair of horses, yet the labor was too severe for a single team, to do a day's work. Your committee believe that this objection may be removed by decreasing the number of spades to one-half now used in the machine, and the form of the spades so altered as to insure the thorough breaking of the lumps, and at the same time decreasing the power required to work it. Your committee are of the opinion that, with the changes proposed, the implement will be efficient and valuable.

WM. S. CARPENTER,
JOHN G. BERGEN,
I. P. TRIMBLE,
Committee.

On motion, the report was accepted and adopted.

Peach Tree Borers.

Mr. Carpenter inquired if he could use hot water at this season to destroy borers in peach trees.

Dr. Trimble.—That is all nonsense to talk about killing the borer with hot water. Dig them out.

Mr. Carpenter said: I have, and killed several trees in so doing. The hot water can do no more. I believe it may be used safely at some seasons of the year. What I wanted to know is, whether any member had tried it at this season, when the tree is in bearing. If no one has, I will, and report.

Mr. George H. Hite.—I have a kind of soap that harness makers use. I don't know what it is made of, but it is a good preventive of the borer. I keep the tree clean, scraping away the dirt, and even sweeping occasionally, and apply this soap as a plaster.

The Limber Twig Apple.

Mr. Norman Matteson, of Berwick, Warren county, Illinois, says in a letter read to the Club:

"I am pleased and benefited in reading the doings of the Farmers' Club

at the Institute, especially on preserving apples past their common season. Distance prevents, or I should attend with you those Club meetings, which to me are so interesting and beneficial. If possible, I would like to present some specimens of choice apples, called 'Limber Twigs.' They are medium size, excellent keepers, rich, fine flavored, do not ripen until April, neither are they fit for use until spring. They do not rot any until May. We have them now in use plentifully, June 27. How kept: November 1, placed on shelves in a large cellar, which has plenty of air and light; windows opened every day except the coldest, and not covered at all through the winter; and the apples remain there yet in the cellar. In the first place I had only eighteen bushels; sold none, but in June could sell for one dollar, while last fall they, with other choice fruit, sold for fifty cents a bushel. I have five trees which bear every year—more bountifully every other year. This year they are full, and will bear about sixty bushels. The trees have been bearing about eighteen years. Next June I will send you a barrel; I would now, but we have nearly found the end of them.

"I am a farmer of two hundred and forty acres; fat seventy hogs, raise as many acres of corn, and other things to match.

"Pardon me for intruding upon your time, but I wish to make a little inquiry: if you know or can recommend some kind of thrifty timber that can be planted on our prairies for fuel, fences and other uses, which timber will be good to last? We thought our common locust would be the tree wanted; they have an enemy called the borer, which kills them by whole groves, in some instances, so we cannot depend on them. A gentleman is now introducing the gray willow, to be set out next spring; he says that it grows readily from the slip; is very thrifty, and in ten years the but-cut will make four rails. The fact is, we are afraid of its spreading, because we are now annoyed with a kind of willow that is worse than worthless, as it spreads rapidly and is difficult to be killed out.

"We now have fine weather for vegetation. Corn looks healthy, and is coming forward very rapidly. Our wheat is gaining in prospect for a middling crop; some complaint of the chintz-bug or fly. Oats are very promising. Potatoes doing first rate; just wet enough and warm. Rye is heavy, and has long heads. Our tame meadows good. The above is in reference to my own farm and my neighbors' around me."

Mr. Wm. S. Carpenter.—I have heard of this "limber twig" apple, and have procured grafts, and have them now growing upon my farm. The chestnut tree grows here very rapidly, and I think it would grow on the prairies. I hope Mr. Matteson will give it a trial. The peach tree makes excellent fuel. I understand it grows very rapidly on the prairies of Illinois. The alianthus, when it gets age, makes very excellent timber for a number of purposes.

The subject of the day, "Country Houses and their Surroundings," was then called up.

Mr. R. G. Pardee.—There is a very ancient proverb, but none the less true at the present time, "fools build houses for wise men to live in."

It is no wonder that the proverb was uttered, and has been so often truthfully repeated, in view of the things every day to be seen. There is

nowhere that it stands out in plainer view than among those who go out from the city to make homes in the country. How many such, having built houses too big to live in, have, as was observed to me the other day, placed themselves in the position of the occupant of a very fine mansion that we were passing.

"That man has built himself out of house and home. He came here from the city two years ago, bought that house half built, which one of his fellows had spent all his money upon, and now this one has spent $10,000 more, and has not a foot of land to stand upon, nor a yard of roof to sit under, and his family are houseless. He is the second fool. We shall see if the wise man comes after."

With such examples continually before them, is it any wonder that the old residents look upon every new comer from the city, making his home in the country, as "a fool and his money soon parted," and that he is fair game for each one to pluck?

It is no easy matter for a city emigrant to the country to spend his money judiciously in making a home. The most of them make their houses too large to live in, and too frequently build themselves out of house and home. Too many duplicate their city house in the country, where it is as uncouth and as much out of place as a true country cottage would be in the center of a Fifth avenue block of brown stone fronts. There is no worse style for the country than a tall brick house with a basement, which, owing to the lack of that perfect drainage we have in the city, is almost always damp.

There is no better style than the frame cottage, "white, with green shutters," half hidden among the trees. If part is two story, it should have spreading wings of but one story, with such breaks in the roof that it will not appear flat, nor the whole square and uncouth.

But I must illustrate my subject by a little personality, for that incited me to write. I have lately visited the country, and write of what I have seen. I write of a familiar name—that of Solon Robinson, long and well known as agricultural editor of the *Tribune*. Three years ago last March, I think, he said to me: "I am going to move into the country. I am tired of this eternal dust and din, brick wall and stone, and am going where I can look upon grass, and trees, and birds, and flowers, and eat unwilted fruits and vegetables—come and see where I am going. It is only sixteen miles from the city hall, yet as wild as though it were a hundred."

So we went out one sunny spring day, up the Harlem railroad, which is lined with spoiled farms—spoiled by making them into skeleton villages—and stopped at one called "West Mount Vernon;" turned off across the Bronx, up a crooked, hilly way, a mile along the road to Yonkers, and three miles from the Hudson at that place. Here we found the spot that he had selected for "a home in the country." Wild enough to be sure. Woods here; woods there; woods everywhere. Two or three old farm houses in sight, half hidden behind trees; old, neglected apple orchards, and old fields enclosed in old stone walls, hedge lined, and the land wearing the disconsolate look that speaks its dumb sign language, saying, "I am worn out and tired of man's mismanagement, and am going back to forest life to rest."

Eight acres of this worn-out Westchester county land, lying in the corner of two roads, surrounded on two sides by them and their bordering of old tumble-down stone walls and bushes; and on another side by a little brook, with its broad margin of bushes and briars, and beyond a spot misnamed a pasture; while on the fourth side it was separated from a pretty well-kept place by a belt of undergrowth so thick that it served for a makeshift fence; and this had been chosen for the "new home in the country."

One from the city had previously made a home here, for here was his unmistakable city mark—a three story house, close by the line of the highway, on a hillside, so that he could have his favorite basement for the lower story, and an entrance from the second floor to the ground on the other side, and yet, upon unlimited space, this house was only eighteen feet wide, with its inevitable side hall and stairway, for so the city house was built.

Truly, a fool built this house, but no wise man will live in it, and so I wondered at friend Solon's choice, but said little; for as he remarked, the land lay well for cultivation, gently inclining to the southeast, with a loamy soil, somewhat pebbly, with here and there rocks of gneiss cropping out, as they do everywhere in the Central Park, and up the same ridge north of it.

That little building, which is a necessary appendage to a country house, and which should hide away in obscurity, was prominently posted up by the roadside near the front door, up the hill; and still further along the road stood the stable, Verily, the fool, in a superlative degree, had been here.

There were some cherry trees; some fine old apple trees, and some others going to decay; a few quince bushes, and the black knotted remains of some plums; and one living peach tree. So the place was not purchased as a "fruit farm," nor because it had a ready built house, convenient and cheap. Though good land, within ten miles of Central Park, with a house, if it was unfit for its situation, that cost $1,000 or more, could not be called dear at the price paid for this. Indeed, at $2,000 it was remarkably cheap; but it was not suited to the purpose for which it was bought—a home in the country for a man of taste. Let us see how it has been made such a home. I have never seen a greater change produced in a shorter time, nor at less expense. It is worth the while of any person about to build a house in the country to visit Solon Robinson and learn how to do it, and, what is most important, do it cheaply.

Instead of the uncouth house I first saw there, I found it had been moved back upon a more level, handsome building spot, and by additions to three sides of it, it has now become a really pretty cottage, with its long piazza facing southeast, and looking down across the flower beds, and lawn, and garden, upon the distant road, now bordered by a neat stone wall.

Rocks and bushes have disappeared, and fruit and ornamental trees and flower beds have taken their place. All around, such profusion of flowers and shrubs, and pleasant things! That prominent little building, formerly by the roadside, has hidden itself away quite out of sight in a clump of evergreens; and the old stable, with a large addition to it, occupies and covers up a spot of bare rocks in the back ground unfit for cultivation, and

is partially shaded from view by a natural clump of bushes, and partly by an artificial grassy mound covering a large cave cellar.

In making the wagon entrance and drive around the house and to the barn, the soil was dug out, forming a receptacle for a great many loads of loose pebbles, and giving rich earth to cover a ragged spot near the house, now planted with some forty grape vines.

All the land, by deep plowing, underdraining and proper manuring, proves exceedingly productive of all that it is asked to produce. The best of the old apple trees have been trimmed and saved, and the worst ones removed, and others that were thrifty but bore poor fruit, have been set with a thousand grafts of choice varieties. Currants, gooseberries, cranberries, strawberries, pears and grapes are all growing beautifully, and in a few years more it will be a home in the country worth having. It is really a pleasant one now, though only half emerged from its barbarous condition.

The house makes no pretension to show, but it has a very pleasant home look, as seen from the road—the look of a real country cottage—particularly of a summer evening when the family occupy the piazza, and the little girl runs along singing, "there comes grandpa, and now we shall have tea, and strawberries and cream; and there comes a gentleman to stay all night."

And there is plenty of room in the cottage if it does not look large. Let us see: opening upon the piazza, with a pleasant summer and winter aspect, are the sitting room and dining room, and three steps below that lead to the kitchen, milk room, store room and fuel room. The cistern pump is in the kitchen; from this room there are also opened ways to the chamber and cellar.

The literary proprietor has arranged his study with two pleasant windows, and with an eye to economy, so that it is warmed by the stove of the adjoining sitting room. On this floor there are also two bedrooms and a small parlor, and hall and stairway leading to four or five bedrooms on the upper floor.

The house, built upon the cheap balloon-frame plan, is made warm by having double walls and floors and ceilings, and good coal fires. It is made comfortable by its general plan, its compactness, convenience, by having most of its room on the same level, and its most used rooms on the side that has the most pleasant aspect.

On the whole, it is one of the few homes in the country that has been cheaply built without great mistake, and one where I have learned something useful.

The consideration of the butter question was laid over until the next meeting.

Adjourned. JOHN W. CHAMBERS, *Secretary.*

July 22, 1862.

Mr. L. A. Roberts, of Brooklyn, L. I., in the chair.

Currants.

Mr. A. S. Fuller exhibited eighteen specimens of currants, and gave their names in the order of excellence, according to his opinion, viz:

1. La Versailles—large red.
2. White Grape—large transparent white.
3. White Holland—identical with No. 2.
4. White Provence—much like No. 2.
5. Yellow Imperial—large white, slightly tinged yellow.
6. The True Red Dutch.
7. The Cherry—large red, a little more acid than No. 1, and thicker skin.
8. The Victoria—a late variety.
9. La Hative—red, early.
10. La Fertile—red, medium size.
11. The champagne—pale red.
12. White Dutch—not large, but excellent.
13. Imperial—red, similar to No. 1 in quality, not so large.
14. Angiers—red, similar to No. 13.
15. Red Provence—late and not worth cultivating.
16. Gloire de Sablons—a new, worthless variety, striped.
17. Old Striped—similar to No. 16.
18. Old White—a small, sweet variety.

Mr. A. S. Fuller.—One of the great faults about growing currants is picking them before they are ripe. Color does not indicate ripeness, as some are red a long time before they are ripe. The Versailles should hang a long time after they are red; so should the Cherry currant, which is naturally strongly acid, and unfit to eat unless fully ripe. One of the peculiar characteristics of La Versailles is that the fruit upon young bushes is generally small, and leads persons unacquainted with it to doubt its good quality. The Cherry currant grows about as large the first time the bushes produce as ever. The plants also grow vigorously from the first, but La Versailles is a feeble grower at first, but very strong when aged. Although some of these currants are good, we want something better. We want a currant of as vigorous a habit as the Cherry, and as productive, with berries as large, combining all the good qualities of La Versailles, White Grape, Imperial, and Cherry, and sweeter than any of them. We need not despair of yet obtaining such a great desideratum.

The Chairman.—How do you raise currants from the seed?

Mr. A. S. Fuller.—It is very easy to grow seedlings. Take the seeds of the best sorts out of the berries when ripe, by washing and mixing with sand, and putting in a box with earth, which should be placed on the north side of a building or wall, and kept till all danger of thawing or freezing is past, when the seed should be sown in drills in very rich ground, where the sprouts will grow four inches high the first year. Next spring transplant in rows where they can be cultivated. Cut off half the length of the plants when transplanted. The seed may be kept a long

time in dried currants. The currant has a wide extent of growth, and one variety is a native of this country. I cannot say how far south it will flourish. Currants will bear in four years from the seed.

Mr. Solon Robinson.—I believe not much below latitude 35 deg. It is a real northern fruit.

Mr. Wm. S. Carpenter.—I have tried a great variety, but consider La Versailles, White Grape, Cherry, and White Provence, all-sufficient for any family, making a good assortment. I do not like the English mode of pruning in tree form. I prefer to cut out old wood, and have suckers start up and make a bunch of canes. I do not approve, either, of training single canes. The natural form of the White Grape appears to be spreading, and the canes are not strong enough to hold up the great load of fruit. The canes and leaves are of a grayish color. This variety is more productive with me than any other variety. The Prince Albert is a good sort, nearly as large as the Cherry currant.

Rev. Mr. Weaver.—I have not had very great experience in growing currants. I prefer the tree form.

Mr. Geo. Johnson.—I wish Mr. Fuller would inform the Club the manner in which he thinks the currant should be pruned.

Mr. A. S. Fuller.—I would always prune in Autumn, and cut out and burn the old wood, because it is infested with borers. The reason why English gardeners got in the way of growing currant bushes in tree form is, that the English black currant grows best in that climate in that form; and so it has been given to others, whose natural habit is entirely different. It is well to cut out all wood after it has borne fruit twice, because the old wood gets wormy, and because it grows too thick and puts the fruit too much in the shade. It needs sunshine to make it ripen perfectly. It is not a bad way, particularly in small gardens, to trim the bushes to single canes and train them upon a trellis, practicing the renewal system. If you wish a tree form, you must cut out the buds from the start. Summer pruning by pinching should be practiced. Cuttings should be made four to six inches long, in September, and set nearly all the length in the soil, straight up, and covered in winter so as not to freeze hard. The objection I have to the tree form of pruning is, that when the top grows heavy it is liable to break off the single stem, particularly when affected by the borer.

The Rev. Mr. Weaver, of Fordham.—I have succeeded well for four years in pruning in this form. The bushes produce well, and are quite ornamental. I have La Versailles, Cherry and White Grape, all of which I consider excellent sorts for family use. I prune my tops in June of surplus wood, and rarely have one blown off. If any fail, it is very easy to keep a seed bed and replace them. I think the fruit grows larger berries and bunches, trimmed in this way, than any other, and it is but little trouble to get the form by taking the young plants and cutting out the eyes next the root.

Mr. Roberts asked for information about making currant jelly. He thought the currants should be gathered before fully ripe, for jelly. If they are ripe, as they should be to make wine, or for the table, they will not make good jelly.

Mr. Solon Robinson.—Gather the currants and pick out leaves, twigs and dirt, and mash them, and squeeze out the juice and strain it, and add a pound of double refined sugar to each pint, and scald it until it makes a jelly, trying it frequently by taking out and cooling a little on a plate, and when it appears to form a jelly readily, cool it partially and take it out into jelly glasses, tumblers or jars, and cover it to keep out flies, and set it in the sun until it is sufficiently hard, and then seal up with white paper, coated with white of egg, pressed over the mouth of the glass.

"Fruits in their Season" will be the subject for discussion at the next meeting.

Adjourned. JOHN W. CHAMBERS, *Secretary.*

July 29, 1862.

Rev. James K. Campbell, of New York, in the chair.

How to Grow Locust Seed.

Mr. T. B. Thompson, of Millertown, Penn., wants to know how to grow locust seed, and how to tell the white and yellow locust apart.

Mr. Wm. R. Prince.—There is no such distinction as yellow and white locust, unless he means the honey locust for one. That which grows universally through this country, and is so valuable for timber, is the *Robinia Acacia*, the seed of which is encased in such a hard shell that it needs soaking in hot water. It may stand all night, and then a portion of the seeds will be swelled, and should be picked out and hot water poured over again and again. I have known it to require thirteen scaldings before all the seeds were swollen.

Mr. Solon Robinson.—I have used boiling-hot ley, poured upon a pint of seed so as to cover it, and left to stand till cool and then planted, and nearly all grew at once. I planted in autumn, and the plants came up the next spring and were tended like any other nursery plants. The best locust timber in the world is grown upon Long Island, and is shipped from there to France for tree nails in ship building. The wood of this locust is yellow; that of honey locust is white and not valuable for timber.

Mr. John G. Bergen.—I suppose that the value of Long Island locust timber arises from its slow growth. It appears to grow almost spontaneously, and the more open the trees stand the better the timber. These trees are unlike almost all others, in this: they do not injure any other crop; grass is rather better in their shade than anywhere else. The great trouble about growing locust timber is the borers, which of late years have destroyed many trees.

Mr. Wm. R. Prince.—The best locust timber is grown upon the northern side of the island, where the soil is clayey. Cobbett, when he lived on the island, got up quite a furor in England for growing this tree. I sent four barrels of seed upon one order. I procured it from Indiana, where the tree grows much more rapidly than here, and bears seed when small. The seed was sold there at five dollars per pound.

How to Keep Potatoes.

Mr. Moses Gilman, of South Sangersville, Me., wants to know how to preserve potatoes over winter, and into the summer, without having them spoil by sprouting. If there is any plan, making it known will be beneficial to many.

Mr. John G. Bergen.—Keep the potatoes in barrels, in a cool, dry cellar, and as often as once a week during the spring, and up to the time that new potatoes come in use, empty the barrels from one to another, and this will prevent the sprouts from getting headway. This is the course that I have pursued satisfactorily for a good many years. If the potatoes are stored in bulk, shovel them from one side of the room to the other. This course is very necessary with some of our early varieties, to preserve them for seed up to the time of planting. I observe that the potato disease has made its appearance on Long Island. Some fields of Mercers are badly affected. It began to show itself about two weeks ago.

Mr. Wm. S. Carpenter remarked that the disease had also begun to affect crops in central and western New York.

Mr. John G Bergen.—The excellence of the potato depends upon location and soil. Sometime since one of my laborers persuaded me to import some potatoes from Ireland, but the produce was not equal to his or my expectations. Some years ago I was in Massachusetts: the potatoes there I thought were the best I had ever eaten. I procured some for seed, but they produced a different flavored potato with me.

Advantages of Bee Keeping.

Mr. O. R. L. Crozier, of Grand Rapids, Mich., presented a paper upon bee keeping, which he denominates an easy way to make money, and he says:

"And as honest and honorable as easy. It needs but little capital, and no unusual skill; neither great strength nor profound learning. It does not depend on political favor nor the smiles of the rich. Rural, but not rude; royal, but not rigorous—it asks but the smiles of nature and a quiet spot. It makes by saving, and does not injure by taking. It requires many operatives, but the business is so pleasant that they cheerfully work without pay, and board and clothe themselves, requiring of their employer only a cheap shelter and a place to store the product of their skill and industry, ready for his use or for market. Yes, that's it. It's keeping bees. You can do it almost anywhere, and make more money from the same amount of capital and labor than in any other business. For example: Mr. N. J., of Westchester county, had one stock last year, a bad season, and it stored sixty-five pounds of honey in super boxes, worth $13, beside filling the hive. Mr. C. S., of Putnam county, has had new swarms make the first season seventy-five pounds, worth $15; and his neighbor, Mr. E., has had new swarms make 125 pounds, worth $25. It is quite common for a new swarm, the first season, to fill their hives and two supers, being in all about 100 pounds of honey. Calling the swarm worth $5, this would give a net profit of more than three times the capital invested; although the new swarm has the premises to fit up and all their comb to build, which would be equal to gathering from twenty-five to fifty

pounds more honey, much of which labor might be saved by intelligent management.

"Properly kept, every good stock wintered will produce a good strong swarm; and it may as well be an early as a late one. Both the stock and the swarm, starting early, and with such advantages as intelligent care may give them—not being allowed to rear hungry hordes of idle drones, nor trifle with their own and their keeper's interests by playing swarm the whole season—will each, by moderate estimate, yield forty pounds surplus honey, making for each stock wintered a net gain of about $20. Most, perhaps, of our farmers might keep from ten to fifty swarms, with as good an average result. Have they any stock that is more worthy of their care? Bees would pay all our taxes if we would let them do it.

"Many a farmer loses more than he makes by not keeping bees, or not keeping them properly. He and his family grow prematurely old with plowing and reaping, mowing and hoeing, and all the drudging incident to tilling, while every flower is saying to them 'send us bees and we'll relieve you from wasting toil.' But for more cruel treatment—what by neglect and what by wholesale slaughter—these sable servants would challenge competition in converting the sweet treasures of nature to their master's use. Spare them life; it is short at best. Let inventive genius protect and aid them—they will appreciate the favor. 'Cut and try,' if need be, as in everything else that promises gain with proper aid, until the right facilities are found. We cannot afford to do without bees, much less to keep them in a profitless manner. The profits of bee keeping may, without doubt, be doubled; and who shall provide a feasible way to do it will deserve a niche with him who makes two blades of grass grow where one grew before. 'A penny saved is two pence earned.'"

The Butter Question.

Mr. Solon Robinson read the following letter from Dr. N. C. Meeker, of Dongola, Ill., entitled "Sending Butter to England:"

The American consul for the city of Bristol, writes in the *Prairie Farmer*, printed in Chicago, about sending butter to England. He says that if a fine article is put up in the most careful manner it will reach that country in good condition, and sell at a fair price, say twenty cents, which will be a good return, as it is only worth from six to eight cents here. If the packer, however, is not guided by the directions he gives, the article will be sold as grease, no matter how good it was when churned. "Most people have been taught to think this well enough, and perhaps worthy of attention. But the shipping of butter to foreign countries, as well as other articles of food, is, when rightly understood, an evidence that we are doing ourselves a great wrong, and I think that if we continue in the present course, we will not only continue poor, in comparison with England, but we will grow poorer. There never can be good times for American farmers till we cease shipping food abroad, and till we cease to be guided by a class of politicians who received their brains from the slaveholders.

"The shipping of butter to England means that our farms, though unproductive to what they might be, yield more than our manufacturing

people need, and that the manufacturing people of England need more than that country produces. If we like, they will pay for our butter in money, but as we have not artisans enough to manufacture for us, we pay for a portion of the fruits of their labor in butter. Here we are, then, paying freight on butter 3,000 miles, and paying freight on goods in return, while it is as clear as the sun in the brightest blaze of noon, that if the goods we need were made at home we would save what is paid for freight, and also the increased price which the butter would bring when sold fresh for immediate use. And it follows that if we ourselves manufactured the goods which England does for us, we would have such a market as she has, at our own doors.

"Three objections are offered, one by England, two by ourselves. She says, and for this reason she always goes to war, 'my laborers must live.' It is a good reply that it is not necessary for any one's happiness that they should live in England. Let them come to America and we will set them to work.

"We ourselves object that if we become a manufacturing people our shipping interests will suffer. Not a bit of it; for our ships instead of being engaged in carrying raw materials, will be as profitably engaged in carrying the same manufactured. This is precisely what England is doing, what she has long done, and it is the secret, if it is a secret, of her immense wealth. Then, we object that if we encourage manufacturing interests we foster monopolies, and help shrewd men to get rich out of the laboring poor. This is an old cry, and the men who uttered it loudest and longest were enemies of our country; in fact they now are in rebellion against it. What! to put down monopolies at home must we labor to build them up abroad? Is the industry of the great West to contribute to sustain the bloated prosperity of foreign countries? Are no people to be rich but the English? Sending butter to England! The cows from which this butter is made had better be employed in hauling materials for building factories, and then if there is more butter than the operatives need, use it to grease the machinery.

"Look at this matter in another light. We have in our country many a million of people owning no land, who cannot profitably be employed, and who think themselves happy if they can get bread, and corn bread at that, saying nothing about butter at all. This class, if set to work in factories of our own, would support themselves well, and help America to get truly rich.

"These things show us how foolish we are; one thing should alarm us. The grain, the butter, the lard and the meat which have been sent from America have actually manured a good part of England, while our soil to the same extent has been impoverished. Travelers wonder when they find the ruins of large cities in the midst of deserts in Asia. To me it is clear that once those deserts were fruitful, and that the soil was carried off with the grain. America, too, will be a desert if we continue in our present course. Our prairies will be like a zahara, without a tree or a blade of grass. One may start little objections, but it is impossible this should be otherwise, for when we send annually 50,000,000 of bushels of grain to Europe, we annually send along with it all that is valuable in the soil of

50,000 acres of land. Figure it as you will you cannot make it less. As a nation we are living the life of a spendthrift; while he cuts out of his capital—we out of out virgin soil.

"Farms in manufacturing districts are more profitable than in grain growing ones, and they continually grow more fertile. On a vast number of acres in New England, more grain can be raised now than was possible fifty years ago. It is a fact, then, that with our reapers and other improvements, even with the increase of our enterprise, and of our knowledge of farming, we are rapidly as possible turning our farms into deserts. At the present rate of shipments of food, in less than three centuries neither corn nor wheat will sprout, and the soil of England will be forty feet deep.

"It is not every one who sees the providences of this war.

"'He sees a hand you cannot see,
He hears a voice you cannot hear.'

"One providence works through Bull Run defeats and through ill disguised disasters, to force on all classes the conviction that we cannot succeed until we are determined to be just. 'By this sign shall we conquer.'

"During these days England is struggling, by means of her capitalists, to lay the foundations of a lasting prosperity. Her plan, her salvation, is to get the control of our finances, to break up our manufactories, then to do our manufacturing, and to have us feed her people. She will fail. For, though we groan over the prospect of a great debt, it will providentially lead us to prosperity and England to ruin. To avoid high duties, which are as certain as death, we will be obliged to raise our wool and flax, our silks and our satins, our fruits and our wines, our laces and ribbons. Then, no longer, O, England, will your forges blaze and your looms rattle for the American farmer. Across his fields he will see tall chimneys, and he will be awakened at morning by the factory bell."

Van Dieman's Land Onion.

Mr. W. R. Prince.—A very fine onion is brought from Van Dieman's Land, via California. It is oval in shape, and sold, when I was there, at one dollar and a quarter per pound.

Great Analogy between the Vegetable Productions of China, Japan and North America, and the Great Normal Causes of this Similitude.

Mr. Wm. R. Prince.—There has long existed among us a prejudicial fashion of continually looking to Europe for new and improved products of the vegetable kingdom, although in many respects we are already far in advance of that continent, which has now become indebted to us for their most valuable implements of agriculture. How much more rational would it be, so far as natural productions are concerned, to look to China and Japan, the former of which awakened such amazement by its vast development of agricultural and horticultural pursuits in the embassy of Lord Macartney, when he first visited that country in 1792; and the latter of

which has within recent years equally excited our surprise, not only by its agricultural and manufacturing advancement, but by exhibiting to us the city of Jeddo, containing three millions of inhabitants, where order, morality and cleanliness reign supreme, thus shaming in the comparison all the boasted cities of the so-called civilized and christianized nations of Europe. Their histories now unveil to us the astounding fact that these vast and populous regions, comprising continent and islands, occupying a remote position, and secluded from European intercourse, became greatly advanced in the arts and sciences countless ages ago, whilst Europe, now so pretentious of her modern advancement, was yet in a state of utter ignorance and barbarism.

The Chinese Empire comprises nearly the same latitudes as our own country, with a climate which, in contrariety to that of Europe, is colder by two degrees in similar latitudes than that of our Atlantic States, as the Isothermal charts of Humboldt reveal to us. The Japanese islands cover the same latitudes as our own land, with a climate ameliorated by the surrounding seas.

These two mighty countries, comprising half the inhabitants of our globe, do, in consequence of their position and climatric character, offer us productions which can here become readily acclimated. In accordance to this climatic affinity, God and nature have stamped a similarity of character on the vegetable productions of China, Japan and North America, which is particularly interesting to the inquiring mind—it being far greater and more striking than between any other sections of our globe. More than twenty genera of trees and shrubs, comprising a vast number of species, are nowhere found native in our wide spread earth, save in two Asiatic countries and in North America. The magnolia, the glory of our forests, the mulberry, deciduous cypress, gleditschia, deciduous azalea tree, calycanthus, illicium, hydrangea, wistaria, weigela, lchisandra. To what is this similitude in their vegetable productions attributable? I can come to but one conclusion, which is this: China presents the same slope to the ocean as the Atlantic States of North America, and combines the same latitudes, with a variation of climate of only two degrees in corresponding latitude; whereas, there is a variation of ten degees between our Atlantic States and Europe, and twelve degrees between China and Europe; and it is found that similar differences exist between our Atlantic slope and China, when contrasted with the Pacific shores of the American continent. The conclusion, therefore, seems incontrovertible, that where there exists a similarity of climate and of connecting circumstances, nature ever imparts a corresponding similitude to their vegetable productions.

Our intercourse with China until 1849 was confined solely to the port of Canton, a city located on the southern limit of the empire, and just within the tropics; and even there we were restricted to a narrow section of one suburb, and not permitted to enter the city or to penetrate the country. The productions of the district of Canton are *sui generis*, and being tropical were not suitable to our country. The tropical sugar cane, the Chinese orange, rice, the dioscorea sativa or tropical yam, and other productions of the district which Canton represents, have long since been acclimated to the congenial warm regions of other portions of our globe. On the opening

of the northern ports of the Chinese empire thirteen years ago, the French, who are ever foremost in obtaining from foreign climes such products as may be grown successfully in their own country, obtained a full knowledge of the tea district, and found the two species to be shrubs, not of the tropics, but of hardy growth in the temperate zone. They also obtained the Sorghus Saccharatus or northern sugar cane, a distinct genus from the tropical cane and the dioscorea batatas or northern yam, now one of the most esteemed esculents sold in every market of France and Italy, and various other estimable vegetables. They also discovered, to their amazement, that China, a country which had been deemed barbaric by the European nations, possessed the most elaborate works on agriculture and horticulture that had ever been written in any country. These were obtained by the French government and translated, and they abound with the most interesting dissertations on every branch of the vegetable economy.

It has been a matter of great surprise to me that the American Institute (to which I promptly made the suggestion), or some other of our national institutions, has not sent a mission to China and Japan to search out and bring home to us every horticultural and agricultural production which have served to enrich and to furnish ample food for those two vastly populous empires. As their aggregate value for nutriment must be of incalculable importance when we witness that they afford such an abundance of cheap food for teeming millions, whereas, on the other hand, in British India, a region much more southern and quite as extensive, with less than half the population, the inhabitants, by a less judicious selection of vegetable products, are frequently visited by intense famine, destroying often a half million of the people in a single year. Another fact, which has caused me still more surprise, as our New York Historical Society had one of its members in China soon after the opening of the ports, is the gross omission on their part to obtain the great and important publications of that literary and scientific empire—an empire which had produced a Confucius five hundred years before the Christian era, a man of gigantic intellect, whose *moral code* has been frequently plagiarized by professed Christians, but has never been surpassed. Independently of the knowledge which might have been thus acquired on every subject calculated to enlarge the area of human intelligence, enriching our agriculture and advancing the arts and sciences most conducive to the happiness and comfort of man, another mighty object could have been accomplished, which is completely identified with the purposes of our historical societies—the re-attainment of that knowledge which, by the destruction of the Alexandrian library, shrouded the early history of our race in Cimmerian darkness and oblivion; the vacuum being only filled by the stupid fictions of Jewish history. Through careful and judicious researches into the far-reaching Chinese histories, which comprise records of countless ages that are yet enveloped in darkness to the mind of the *professed* enlightened nations of Europe and America, we could have filled up the vast chasm in the records of our race, the mighty vacuum in the world's history in an eminent degree, which unfortunately has so long left our minds to ponder in vain solicitude, dependent solely upon fictitious legends, and upon the pretences and delusions of priestcraft and fanaticism.

Fruits in their Season.

There were exhibited on the tables, to-day, an excellent display of currants from the farm of Prof. Mapes, viz:

La Versaillaise, Queen Victoria, Red Dutch, Red Gondouin, Cherry, La Hative, White Gondouin, White Grape, Fertile de Pallua, White Transparent, White Dutch, and from Mr. W. R. Prince a very fine currant called the White Provence.

Mr. W. R. Prince.—The La Versaillaise and the Cherry I think are the same currant, so nearly do they resemble each other.

Mr. W. S. Carpenter considered them both the Cherry. The Victoria is distinguished by its long red bunches, and the Red Dutch by the excellence of its flavor.

Mr. Prince.—I consider the White Provence the most productive of all currants, and it grows the largest berries.

Mr. Carpenter thinks that White Provence, La Versaillaise and the White Grape are the three best sorts, and all that a family need to grow.

Barren Grape Vines.

Mr. W. C. Crosby, of Bangor, Maine, gives the following account, to prove that there are barren grape vines:

"In the discussions of the Farmers' Club I notice one respecting barren grape vines, but I don't remember that any one said anything respecting sex.

"I have a vine which I planted for a 'Vermont native grape.' It has blossomed several years and borne no fruit. This year I examined the blossoms, and find them wholly destitute of pistils. The stamens and anthers appear complete. Of course no fruit is to be expected from such blossoms."

A Great Crop of Strawberries

Mr. R. Green, of Reelsville, Indiana, communicated the following:

"In the spring of 1861 I cleared out a small ridge of ground that was heavily covered with beach and sugar timber, and set out 600 Wilson Albany strawberry plants, three feet apart each way, as near as I could for the stumps and roots, which pretty nearly covered the ground. The ground was never plowed. I put the plants in with a hoe as well as I could, in many instances having to cut off roots two inches through to make a hole for them. In the course of the summer I hoed the ground over two or three times, loosening it as well as I could for the roots that literally covered the ground. The piece contained one-tenth of an acre, with ten or a dozen stumps that would average at least four feet square. This spring the plants nearly covered the ground. That was all the culture they had until after the berries were picked this summer. The result was twenty-five bushels of strawberries, actual measure. Now we think that doing pretty well for Hoosierdom, particularly with the small amount of labor bestowed upon them. The ground was a narrow ridge, naturally well drained, which would yield twenty-five or thirty bushels of corn to the acre if well attended. The result has been so satisfactory to me that I

shall continue the same kind of culture as long as I can meet with the like results, deep plowing and trenching to the contrary notwithstanding."

The Strawberry Tree.

An inquiry was made about this shrub, an account of which was lately published in the Boston *Recorder* as something new.

Mr. Wm. R. Prince.—It is not new. I have had them growing in my garden a long time. One variety is a native of this country, and the species, the *Euonymus*, is well known to all botanists. It is not generally grown for its fruit, but as a beautiful shrub when loaded with its beautiful crimson berries.

Preserving Fruit in Sealed Air-tight Bottles.

Mr. William T. Parker, of Birmingham, Erie county, Ohio, sends the following interesting letter upon this subject, and gives a new way to seal up fruit in bottles:

"Seeing among the doings of the Farmers' Club, some reference to preserving fruit in air-tight cans, I will venture to give you something of my views and experience in that matter. People have learned, probably, by experience, that fruit, flesh, or any other organic material, placed in an air-tight vessel brought to a scalding heat, when sealed so as to prevent the passage of air in or out, will be preserved an indefinite length of time. This is a valuable discovery of modern times. Now, what is the philosophy of this fact? Is the fruit preserved from fermentation and decay because the air is all driven out by the heat? I think not, because a perfect vacuum is not necessary, neither is it ever obtained in the common process. If a vacuum should be produced it could not prevent fermentation in the fruit, because all the elements necessary for that process exist to some extent in all such substances. It is true the process would be slow, but destruction would eventually result. Mr. Osgood's inquiry, 'whether exhaustion of the air by means of the air pump would be equally effectual?' may as well be answered at once in the negative.

"The opinion has long been gaining ground, from the experiments and observations of Liebig and Gosse, that the destructive processes of putrefactive fermentation are produced by the growth and increase of microscopic plants and animals. If this theory is true, it is plain that in canning fruit the essential point is to thoroughly *kill the organic germs*, by bringing the whole mass to such a heat as will effectually extinguish all vegetable and animal life. After this is accomplished, all that is necessary is to seal it so no air can get access to the fruit. Atmospheric air is supposed to be filled with organic molecules, which are ever ready to spring into life when they fall into a suitable soil.

"Let me trouble you now with the mode of putting up fruit used by some of us folks in Ohio, and if any member of the Club can give a better or a cheaper mode we shall be glad to improve.

"A glass jar or bottle, or stone jar or jug, or any tight vessel having an opening large enough to admit the fruit, will answer. No corks, capsules, ground glass stoppers, rubber rings, or steel clamps are necessary.

"Have some wax ready, made of rosin seven parts, tallow one part, well melted together. This is to be put on hot.

"Now heat your fruit in an enameled kettle till boiling commences, and all parts are certainly brought to a proper heat. Have your jar hot, also the wax. Dip in the fruit expeditiously, shake down, and run a straw down to the bottom several times to let out bubbles of air. Fill the jar even full. Then tie a strong cloth over the top with a piece of wrapping twine. Shear off the corners and edges within half an inch of the string. Then dip out some of the hot wax and pour it on the cloth capsule, wet your hands in cold water and press and mould the wax over the whole cover, letting it come over the edge so as to adhere to the jar all around, and the job is done.

"As the fruit cools it sinks down a little, and the capsule follows it, forming a cup on the top, thus preventing any strain which favors a leakage of air."

Quantity of Bone Dust to be Used per Acre.

Mr. Wm. S. Carpenter.—It has been asked how much bone dust I use per acre. On the heavy soil of Westchester we use the coarse bone dust, twenty bushels of barn-yard manure, in which one bushel of bone dust is mixed, will be decomposed in about twenty days. Land will bear any amount of bone manure. I have used one hundred bushels per acre, on sandy soils. The pure dust is the best. The cost is about $25 per ton. Where the soil is light, sometimes the bone dust will remain in the soil for twenty years.

Adjourned. JOHN W. CHAMBERS, *Secretary.*

August 5, 1862.

Rev. Joshua Weaver, of Fordham, N. Y., in the chair.

Agricultural Department at Washington.

Mr. R. G. Pardee said that he thought it should be more generally known that the chief clerk of the new Agricultural Department, at Washington, is a citizen of New York, well known to many of us here, but not to the farmers generally, as one of the most affable, as well as intelligent young men. He is very anxious to be useful to American agriculture in his new position, having always taken an active part in the promotion of its improvement. Our friends throughout the country may rely upon the most gentlemanly treatment in all their communications with Mr. McCormick. No better selection could have been made for the position.

Brakes and Worms.

Mr. A. H. Hatch, Gilmanton Iron Works, N. H., asks the club to give him information on the following subjects:

"1st. What is the most *effectual* way to kill out common pasture brakes?

"2d. What must be done to old garden lots when worms of various kinds infest the soil and repeatedly destroy whatever is sown and planted?"

Mr. Pardee.—To kill the brakes I would apply salt or phospbate of lime.

Mr. Adrian Bergen.—I would plow up the soil in the fall, and let it remain so all winter.

Mr. Wm. S. Carpenter.—I would spade the ground in ridges in autumn, and apply salt and gas lime in the spring.

Mr. Solon Robinson.—That is all very well to talk about plowing; but a great deal of land where brakes grow never was plowed and never will be. If salt will kill them without plowing then it would be the cheapest method that could be adopted.

Mr. R. G. Pardee.—The worms were troublesome in my garden last year, and I watched for the last day that I could spade it up before freezing. That night the newly spaded earth froze solid, and finished off the worms effectually. I have no doubt it saved my crop of grapes this year.

Mr. Wm. S. Carpenter.—I recommend gas lime as well as exposing the soil to freezing. But it must be used carefully where there are any shrubs or plants, or it may kill them. I think it will kill worms. I am sure salt will, and so it will vegetation, as I have experienced to my cost, by having a man put it where he was told not to put it. I have been using a new fertilizer last year that is also death to everything it comes in contact with, until it is decomposed. Then it is a very valuable ingredient. This is printers' roller composition. It must be used with as much caution as guano, salt or lime.

Barberry Hedges.

A gentleman in Chautauqua county wants to know about the use of barberry for hedges.

Mr. Solon Robinson.—This bush is a prickly shrub, and grows six or eight feet high, and I have often wondered that it is not used as an ornamental shrub. The foliage, blossoms and fruit are all very pretty. The berries are very bright scarlet, half inch or more in length, and near a fourth of an inch in diameter. They are exceedingly acid and are used for culinary purposes. The bush is easily propagated by seeds, roots or suckers, but I would not recommend it for hedges, because it exhausts the soil. The roots are used for coloring yellow, and the bark for medicine. This bush is of the Berberris genus, and should not be confounded with one known as Baberry, in New England, where both grow quite common. Barberry produces acid red berries. Baberry berries are not larger than bird shots, of a bluish-green color, from which vegetable tallow is produced, which is of a light green color, very hard and dry, and prized for mixing with beef tallow, to make candles for summer use.

Iodine for Insects.

Dr. S. J. Parker, of Ithaca, said: Can any one in the Farmers' Club give any account of the use of iodine as more economical and useful than sulphur in preventing insects and mildew in graperies? It is said that the use of a minute quantity in the water with which the roots in the border are watered, renders the vine less liable to mildew. That insects are not fond of the slight fumes of evaporating iodine. Has any one of the Club ever used it—fumigated with it at night?

The Chairman.—This question will be open for future discussion or communications.

Dr. Parker also made inquiry about grafting grape vines.

Mr. Wm. S. Carpenter.—The best way to graft a grape vine is to drive wedges through a vine, at intervals, say of a foot, and sharpen the scions and drive them through so they will project on the under side. Then lay the vine down and cover it in a trench, extending from the root so that water will not stand in it, leaving the extremity of the vine out to grow its own branches and leaves, and next spring the whole can be taken up and cut apart, and set where the vines are to grow.

The French Tree Tomato.

Dr. Parker does not speak favorably of this kind of tomato. He says it is pretty near a failure if planted late. Those started early are doing better, particularly on a dry loamy hill side. He wants to know how cultivators about New York are pleased with this new variety.

Mrs. Ham, of Columbia county, presented some specimens of blackberry wine, which, after being tasted, was pronounced excellent. It is made as follows: one quart of juice, two quarts of water, three pounds of sugar, fermented in casks and drawn into bottles, corked and sealed, and kept two years before being used.

The Fruit Question.

Fruits in their Season, and conversation about fruits, with samples, is a standing question.

Mr. Wm. S. Carpenter presented some beautiful apples and pears, now ripening. He remarked that the Red Astracan apple is not only beautiful to look at, as may be seen, but it is a profuse bearer and valuable market apple, good for cooking, and a fair table apple. It ripens about August 10th. Here is the Early Harvest, and Red Marguerite, and Sweet Bough, all good apples, now in season. Several others were in the collection, and the Beurre Giffard, Madeline and Doyenne d'Été pears. The Red Astrachan apples were grown upon dwarf trees, only three and a half feet high; they were grafted upon Paradise stocks.

To Preserve Fruit all the Year.

Mr. Robinson read from an English paper the following method to preserve fruit all the year: "Take of saltpeter, one pound; bole armenia, two pounds; common sand, well freed from its earthy parts, four pounds. Mix all well together. Gather the fruit with the hand, before it is thoroughly ripe, each fruit being handled only by the stalk; lay them regularly, and in order, in a large, wide-mouthed glass vessel; cover the top of the glass with an oiled paper, carry it into a dry place, set it in a box filled all round to about four inches thickness with the above preparation, so that no part of the glass vessel shall appear, being, in a manner, buried in the prepared niter. At the end of a year, such fruits may be taken out as beautiful as when first put in."

Raspberries.

Mr. Wm. S. Carpenter.—This season I have cultivated for family use the Brinckley Orange raspberry. It is not fit for market, but for the family I do not think it can be surpassed.

The Chairman.—I like the Franconia very well indeed; the Allen I would not have.

Mr. Solon Robinson.—I received as presents from several nurserymen and friends, several sorts of raspberries, which I planted, partly along the north side of a wall, and partly in the open ground in the garden. I have no fault to find with the growth of vines, for they are overwhelming. But I have some fault to find with their productiveness. I wish they were all, except the Brinckley, out of my garden.

Russell's Strawberry.

Mr. Wm. P. Robinson, of Auburn, N. Y., thinks injustice has been done to the Russell seedling strawberry. He says:

"From the 10th of June Mr. Clapp commenced picking from a patch twenty feet in length and ten feet in breadth. From this bed he has picked over three bushels of this luscious fruit; and as late as the present time (July 19) he picked five quarts, fully as delicate in flavor and as large in size as those that were gathered when the strawberry season was at its height. I have now before me several that were this morning picked at random from Mr. Clapp's garden, which average four and a half inches in circumference, and I have seen those that measured six and a quarter inches."

Mr. Solon Robinson.—There can be no objection to its size, that is certain; my great objection to it was because it is a pistillate, but Mr. Clapp says that his experience is that one plant to fifty is amply sufficient as a fertilizer.

Mr. R. G. Pardee.—I examined this berry carefully, and did not find it any larger than Longworth's prolific, nor of better flavor, and I cannot learn that it is a better bearer. It certainly is not equal to Mr. Fuller's three new seedlings in any point of view. Those combine many excellent qualities. I examined the Russell berry closely, but could not see the advantages claimed for it, though it is doubtless a good family berry. What we want is a berry as prolific and large as the Wilson or Russell, and delicious as Burr's new pine. My list of six strawberries would be Wilson's, Hooker's, Hovey's, Longworth's, Burr's, and Triomphe de Gand.

Mr. Wm. S. Carpenter.—I think the day of pistillate strawberries has gone by. Still, I am going to try this new one, and see if it is really valuable. I have no idea that it is equal to Mr. Fuller's three new ones.

Flowers.

Mr. R. G. Pardee.—I hope the members will not fail to notice these beautiful flowers presented by Mr. Weaver. These double zinnias are very fine, and so are the double balsams. They have been grown upon rich land. These beautiful pansies can be grown from seed or slips. The cuttings are easily struck in sand.

Ripe Peaches in Southern Illinois.

Solon Robinson—The following letter is from our old correspondent, Dr N. C. Meeker, of Illinois. It shows that that State is ahead of us in fruit:

"Cairo, *July* 29, 1862.

"Many of your readers will be surprised to learn how extensively good fruit is raised in southern Illinois. Ten miles above Cairo, the Illinois Central railroad enters a hilly country, and thirty miles further north the hills are from two hundred to five hundred feet high. Usually there is enough level ground on top for common sized farms. The passenger sees tasteful cottages standing on lofty eminences, or on the edge of jutting crags. What at a distance seem rows of corn would, upon near approach, prove to be rows of fruit trees. At the stations, boys offer for sale pears and beautiful peaches. And yet no part of Arkansas contains a population more deeply in sympathy with the rebels in their attempt to destroy this government, and to make slavery perpetual, than are a majority of the people in some of these counties. As an evidence of this fact, I repeat a statement made by Mr. Osborn, the president of the road, which is that, having occasion to travel a distance of fifty or sixty miles at some distance from the track, he nowhere could get a meal of victuals fit to eat.

"But it is not a disloyal man living in that Gothic cottage almost over your head. He was born in New England or New York, and to the education he received at home he has added a Western polish. He has guns in his house. At South Pass, Union county, forty miles from Cairo, live some twenty of these Republican fruit growers, each having from twenty to eighty acres of peaches, pears and apples. They understand their business well, and they are distinguished by the Yankee characteristics of industry, shrewdness and intelligence. The natives know they are not cowards, and they know what cowardice is. They have a horticultural society well supported. Parker Earle, from Vermont, is its secretary.

"Within a distance of a few miles around this place I estimate that there are from 700 to 800 acres of peach trees. This fruit is ripening now. Two or three car loads of the nicest peaches you ever saw leave every evening by special train for Chicago. The receipts of the owners of these orchards range from $10 to $300 a day each. The season will last from fifteen to thirty days. Some have contracted for their entire crop at two dollars a bushel, delivered at the station. The prices would be thirty per cent. higher if change were plenty. They cannot supply the whole demand. Those parts of the State where the richest men live, and where the most wealth is found, that is, around the towns of Bloomington, Urbanna, and thence westward to the Mississippi, probably will get few peaches. Somebody must raise for them hereafter, as well as for the future additions to our population. I know of one nursery where fifteen bushels of peach stones were planted last spring, and now there are thirty thousand young trees which will be budded this autumn.

"The natives are astonished, and they are going to raise fruit. For the most part, they will do nothing. They do not know enough to raise fruit; and men smarter than they can fail. One may think he knows how, but that will not help the matter. The greatest obstacle which prevents many

from succeeding is the competition they meet with in men who know more than they do. Industry is truly important, but alone it will not win. Still it is by no means difficult to raise fruit. I think that frequent visits to the best orchards, and a good share of common sense, will enable one to succeed. If he do fail, he will be a fool if he does not try till success crowns his efforts.

"Still, from various causes not more than a quarter of the fruit trees set out in our county will amount to much. The price of fruit has advanced during the last twenty years. In twenty years more, if fruit growers are very industrious, and if too many children are not born, common people may be able to buy early fruit; and early fruit can be raised as easily as late fruit. A man who works right can afford to work for less than one who works wrong; that is, if he have the product of his industry to dispose of.

"Let a wide-awake Yankee come hither and set out well known and good varieties, and he will do well. He will want ten or forty acres of good high land. Ten acres will do as well as forty acres for many men. At South Pass suitable sites sell from $20 to $30 per acre. When covered with bearing trees they easily sell for $100 an acre. There are farms there which can be sold for $150 an acre, and the trees are only four years old. They make the trees bear at this age, often sooner. I saw trees two years from the bud, for which $5 were given for the fruit from each tree. South of the point named, good improved farms near stations, and where peaches never fail, can be bought for $15 an acre. I know of twenty or thirty such chances. The railroad will sell suitable land, mostly timber, for less, and give long time. They offer every inducement to fruit growers. The freight that is paid them for an acre of peaches exceeds what they get for what is paid for a hundred acres of wheat. The receipts from five acres of peach trees, in full bearing, will buy a good farm.

"Pears do well here; so do apples and strawberries. Plums, cherries and currants do poorly. Grapes are uncertain; they rot. One man expected to have twenty tons; he hopes to have two.

"Much disappointment is felt regarding certain varieties of peaches. The early York, *serrate*, was supposed to be the earliest and best; it rotted. One man makes his loss $3,000 by the early York, and yet his receipts will reach $500. Crawford's Early is the finest peach, but it is so large that it does not retail at a profit, and it is a shy bearer. The first shipments were the early Tillotson, which was about the 18th inst. The peach which ripens first is wormy; it ripens first because it is stung. The peach which now is esteemed most for the qualities of earliness, size and color, is the Honest John, of New Jersey, and Western New York. The tree is full size, fair color, mostly red, flavor good.

"Some wishing to come hither would like to know how much money they ought to have. I consider myself posted on this head. I answer that with from two to five hundred dollars you can start yourself handsomely. With five hundred dollars one can do well. Some have commenced with less. But, whatever you have, you must have earned it at some kind of labor or honest business. If you come by it without labor, or without having been brought up to labor, you probably will lose it. If you have been brought

up idly, and have no money but what is given you, put it out at interest, and then come and support yourself a year or so by day's work, when you can safely use it. The kind of business you have been accustomed to is comparatively of little consequence. If one can walk to the east, he can walk to the west. Some have nothing to come with. It is difficult to advise them. Industry and patience will go far. If one has a family and no money what can he do? Still, fair intelligence being given, one can work wonders, providing he only has the constitution of a horse and the energies of a lion. Such can get money anywhere."

Adjourned. JOHN W. CHAMBERS, *Secretary.*

August 12, 1862.

Mr. Geo. H. Hite, of Morrisania, N. Y., in the chair.

Lightning Conductors.

Mr. Solon Robinson.—I present a letter from Roundout, N. Y., asking the following information:

"1. Common iron, liable to rust, should it be used for lightning rods, and what size should the iron be?

"2. As the rod must have some support in its descent to the ground, what is the best non-conductor through which it should pass, and how should that non-conductor be fastened to the building?

"3. Should the rod be pointed with copper or quicksilver, or with what else, to afford the greatest attraction to the fluid as it passes?

"4. What distance will a good rod, properly put up and pointed, attract the lightning?

"5. Considerable damage has been done in this vicinity already by lightning this season, and many people are persuaded that a rod, properly put up, will afford protection to their property, yet do not know how to do it as it should be done; and there are so many men going round the country recommending this and the other plan, this and the other non-conductor, as best suits their fancy or their interest, that we really do not know what is best."

Mr. Solon Robinson.—I will answer these questions in this order, giving my opinion:

1. Common iron rods, in continuous lengths, to reach from ten feet above the roof to ten feet below the sill of a building, may be used, and it should be three-fourths inch diameter.

2. It may be fastened to the building with wood or iron. Insulators are not necessary.

3. The rod should not be pointed with quicksilver nor copper, but with gold or platinum, as it only possesses attractive power while very bright.

4. I cannot say, but doubt its attractive power over half the area it is usually put up to protect.

5. If any one is persuaded that a lightning rod is a protector, I advise him to put up one upon every building he owns, and if the building is ten feet across, put up two or more, so as to have the points not more than ten

feet apart. Then, if there is any virtue in such protection, you will have it. I have none upon any of my buildings.

American Raisins.

Mr. J. H. Sherman, of Galesbury, Ill., asks if any member of the Club has made raisins from our native varieties of grapes, and if so, what is the process?

It was stated by a member of the Club some year or two ago, that the Diana grape readily dries and becomes a rich winey raisin. A similar assertion in regard to both the Diana and Delaware grapes, was made by Mrs. Nairin, of your city, in her interesting letter read by Solon Robinson last spring. Presuming that good raisins had been made by the writer of article referred to, or by others to his certain knowledge, I take the liberty of asking that the process be made known through the proceedings of the Club.

No one was present who could give the information, but the Chairman said he would translate from French works in his library, and next week give the process by which French raisins are made.

The Grape Rot.

The Chairman stated that the grape rot is now attacking the grapes in this vicinity. The Catawba suffers most. The Concord and Diana are also affected. The Delaware, Herbemont, Isabella, Union Village and Northern Muskadine, are so far free of the disease.

Mr. Solon Robinson.—The following is the German remedy:

"Dissolve two and a half pounds of glue in ten gallons of boiling water, and when cooled so as not to be either stiff or too thin and watery, dip the bunches of grapes in the solution, by holding a pan in one hand and guiding the branches with the other, so that each one will be coated with a thin film of gluten, which preserves them from the action of damp atmosphere, which produces the disease."

Fruits in Season.

Mr. R. G. Pardee presented some fine specimens of ripe Bloodgood and Buerre Giffard pears, and some Tysons, nearly ripe, from Iona Island.

Fruits and Flowers in Kansas.

Mr. Solon Robinson.—The following interesting letter, from a lady residing at Black Jack, Kansas, and I ask our flower growing friends to send her an abundance of seeds, to enable her next year to rival the natural flowers of that region:

"Is there anything singular in these strawberry leaves? When we first came to this place, four years ago last spring, my husband purchased some strawberry plants of a person who had forgotten their name. They have never borne fruit, owing, we suppose, to their having been planted in sod ground. Last spring I transplanted them into deep, rich soil, made in ridges a foot high, and filled the intervening spaces with hay. It was late before I could transplant them, and the season has been very hot and dry,

and therefore they bore no fruit, but the vines have grown finely, and I have kept the runners down, and unless they are of a barren kind, I hope next year to have an abundance of fruit. To nearly all the plants have been added an extra pair of tubular leaves like those I have sent you. They were never so before, and they may be new to you and your friends. I intend to have some of the Wilson's Albany in the fall. I read with great interest the discussions of the Farmers' Institute Club, and have tried to learn how to treat grapes and strawberries. Some weeks ago the expediency of covering strawberries in winter was discussed. I think they need a light covering of hay here, as we cannot depend on a covering of snow, and we are liable to sudden changes from freezing to thawing, and vice versa. I think I do not yet understand how to prune grape vines. I trim them to as many canes as I want, but they soon sprout out again, and make me a deal of trouble. Last spring I tried an experiment on a wild grape vine. I separated it into four parts, each of which had a good root, and with the point of a penknife dug out all the little eyes or knobs from the roots, and from the tops, excepting where I wished for branches. They all look well now, and have not sent out shoots and branches as others do. Garden grapes treated in this way may make less trouble I have hoped to see currant culture discussed. The prevalent opinion in Kansas is, that the currant will not prosper here. I think it is because people planted them in sod ground at first, and have let them remain there. I removed mine into cultivated soil last spring, and they have grown more than they had in all the previous four years. I believe Mr. Pardee understands the business, and will he please relate some of his experience? I imagine that even wise men may sometimes be mistaken, and I take the liberty to say that Mr. Bergen's idea about feeding chickens is, I think, an entire mistake. I raised chickens in Saratoga county about twenty-five years, and never saw one with the gapes, though I sometimes heard of the disease among my neighbors' chickens. I always fed them myself, so as to be sure it was well done, and was very careful that they should have newly mixed meal, thinking it was more nourishing and refreshing. That was their principal food, and they were always healthy. Sometimes a young one was weak, and I would feed it a few times with bread pills. I have so long wanted to write to you that subjects have accumulated. I have long hesitated, but have come to the decision that, as you have received letters from the north and east, it is fair that you should hear from the west also. I wish that your Club would more frequently discuss floriculture. Like Miss A., of Vermont, flowers are very necessary to my happiness. I brought many with me five years ago, but lost them all before we were settled. I began anew, and lost most of my nicest plants two years ago. Through the kindness of friends, and by a few purchases, I have a showy garden now, and people who have traveled over Kansas say I have the handsomest garden in the State. And yet, owing to the dry, hot weather, many seeds I planted failed to come up. But Kansas is itself almost a flower garden, and my principal object in writing is to bring the Kansas flowers into notice. I think that on this half mile square there are as many as twenty kinds which would be very much admired in eastern flower gardens, and

every mile or two changes the kind of flowers. There may be some difficulty in germinating them in eastern soil, but they are even worth some trouble. This season has been rather dry; but in a moderately wet season the prairies and ravines are peculiarly interesting to the florist, and especially to the practical botanist. On this place are two perennial species of Delphinium—one a rich blue purple, blooming in April, with a tuberous root, very beautiful; and the other white, with a dark tuft in the center, and very delicate.

"The sensitive briar, (Schrankin), two species perennial phlox, that I never saw east, and also a verbena, are very beautiful. I might mention many others, but have written too much already. I have sent some seeds to Messrs. McIlvaine & Young, and shall send more, hoping they will succeed in cultivating them, for I want all the nice gardens in my dear old State to have them. Excuse me.—I never can stop when talking about flowers.

"I am, sir, yours respectfully,

"C. W. CRAIG."

The Butter Question.

Mr. Solon Robinson.—We have had this question before us some time, awaiting my movements, because I promised to prepare an article which should contain a great deal of practical information upon this very important subject. I have therefore collated from the published opinions of some of the best butter makers in the country, a mass of matter that is worth preserving in the record of our proceedings.

THE WHOLE ART OF MAKING AND PRESERVING BUTTER.

A. B. Dickinson, of Hornby, Tioga county, says:

"One of the first requisites in butter making is care that all the utensils of the dairy are kept sweet and dry; that the milk room is well ventilated, of a proper temperature, free from dampness and the unpleasant smell generated by moisture; that the cream is not allowed to stand too long upon the milk, nor after it is skimmed; that it be churned at a proper temperature, the operation being neither hurried unduly nor carried too far; that it should be salted with the nicest salt obtainable, not injured by the addition of sugar or saltpeter, and that all the buttermilk be properly and effectively removed.

"The utmost moisture which should be found in thoroughly worked butter is a very slight dew, and it should be of such firm consistency as to slice down, hardly dimming the brightness of a knife blade. No butter is properly made unless it will bear these tests.

"For depositing the milk when strained, the tin pail of the capacity of about twelve quarts is preferable to any other kind of vessel. It is sufficiently large to fulfill all the requirements in that particular, while its superiority over the shallow pan, which is considerably used, is too palpable to admit of doubt.

"No first quality of butter can be made either in November or August. While the one is too cold with frost bitten grass, the other is quite too warm, and without ice it is impossible to make first quality of butter. Be

careful in washing butter to handle it with a ladle, so as not to affect the grain; then put it away in some sweet, cool place, out of the reach of any bad odor which it might absorb. When it has stood long enough to get its proper rich color, work it over and lay it down, and keep it with the same degree of care. It would spoil in sixty days in a common farm cellar, where meats, fish and vegetables are kept.

"It would be a much easier task to teach a man to make a watch than how to make the first quality of butter, as it is the most sensitive and the most liable to injury of all the eatables extracted from the vegetable kingdom. It is so sensitive as to partake of everything that can affect it that comes in contact with it—as onions, carrots, parsnips, fish or anything else that would make it unpalatable, either in the butter or the milk before churning. Not only so, but the butter partakes of everything the cow eats or drinks, and the longer it stands after being made the more perceptibly will the unpalatable things on which she fed make themselves manifest. By this it will be seen that the most important thing for first quality of butter is the food of the cow. Neither from roots of any kind, nor grain of any description can first quality of butter be extracted. It must be from something that imparts a sweeter and finer flavor. The cow must give good rich milk, as first quality of butter cannot be made from poor pale milk, for it lacks the essential quality of good butter."

Good cows, sweet feed and pure water are the first requisites to the manufacture of good butter. Good cows, that proper color and right consistency be secured; sweet feed and pure water, that no flavor be imparted to the milk which would render the butter unpalatable. Rest and quiet are as important to a butter-producing cow as good food. She should never be dogged, beaten, driven on a run, nor have her quiet in any way disturbed. Dependent, however, as the quality of the article is upon the cow and the goodness of the food, a proper degree of care and skill on the part of the dairy woman is of much greater consequence.

CHURNING, WASHING AND COLORING BUTTER.

In spite of all the patented improvements, the old dasher churn still holds its position, not only in families but among dairymen. The following are A. B. Dickenson's directions for churning milk and working butter:

"The churn should be as nearly straight up and down as possible, as the dash should stir all the milk every stroke it makes, so that the butter in the churn should all come at the same time. If the milk is too cold, the only safe way to warm it is to place a pail of milk in a large boiler of warm water, to bring it to the exact temperature, which is about 55 to 60 degrees—a few degrees warmer in cold than in warm weather. As soon as the butter has come and gathered, take it immediately from the churn in its warm state and put it into cold *salt* water; then commence pulling the butter over with the ladle in so gentle and careful a manner as not to affect the grain, for as sure as that is injured at the washing or working, the butter becomes oily and can never be reclaimed. Every particle of milk must be washed out, and then season with best Liverpool salt. Set the bowl away until the next day, and when sufficiently cool, work the mass thoroughly, but not so as to make it oily, and on the third day pack

it away if it has assumed the right color. Examine it well before packing, and be sure that no milky water runs from it, for if packed with the least drop, you will hear from it next April.

"If your spring or well is hard water, save ice from streams, as lime never congeals with ice. Save rain water, and then with ice you will save soft, cool water to wash your butter, without which you cannot get the milk out without injuring the grain. Soft water is as indispensable to wash butter as it is to wash fine linen. Washing butter is not positively necessary, if it is to be used in a few weeks.

"The idea of coloring butter with anything after it is made, is as absurd as painting rye bread white, with the expectation of making it taste like wheat."

Jesse Carpenter says:

"The milk in the churn, when fit for churning, should indicate 64 deg. Fahrenheit, and should be agitated with a movement of the dash at not less than fifty strokes to the minute. Less motion will fail to divide properly the butter from the milk. When done, the butter should be taken from the churn and thrown into a tub or small churn partly filled with water, 42 to 44 Fahrenheit, and the buttermilk forced out with a small dash. It should then be put into trays and washed until the water used ceases to be the least discolored with buttermilk. It is then ready for salting, which done, carry the trays immediately to the cellar. Use one and a half ounces of salt to the pound of washed butter. Three or four hours after the first salting, stir with a ladle, and put it in the form of a honeycomb, in order to give it the greatest possible surface expansion to the air, which gives color and fixes the high flavor.

"Butter, when well manufactured, while standing preparatory to packing, is composed of granulated particles, between which are myriads of infinitesimal cells, filled with brine, which is its life. At this period it should be touched with a light hand, as too much and too careless working will destroy its granular and cellular character, and reduce the whole to a compact and lifeless mass, with an immediate loss of flavor, and a certain and reliable prospect, if packed, of a rapid change from indifferently good to miserably poor butter. It should never be worked in the tray while in a dry state, or all the ill results just alluded to will follow. As a general rule, after the butter has stood in the trays twenty-four hours, and has been worked three or four times as directed, it is ready for packing. After the firkin is filled it should stand a short time, and then should be covered with a clean piece of muslin, and the whole covered with brine."

Mr. H. E. Lowman, a neighbor of Mr. Carpenter, states the following fact about his butter, which is a strong one in favor of washing butter:

"Mr Carpenter, for the last twenty years, beside fattening the calves to the customary age of four weeks, has averaged a fraction over two firkins to the cow per year. He has had butter stand in packages in his cellar for one year and a half, and open them with a flavor so fresh and sweet that the very best and most critical judges and buyers were deceived one year in its age, none suspecting it to be the product of the former year. He never has, during that period, failed to reach the highest figure representing the maximum market for Orange county butter, and lately he has

very often exceeded the very highest market from one-half cent to two and a half cents per pound."

Butter is judged by its color, aroma, taste and consistency. Its color should be a delicate pale straw, not approaching white, and yet perhaps that is better than the deep orange tint, almost a sure indication of extraneous coloring matter. The peculiar smell of good butter is easily recognized. The better the quality the more delicate the aroma, while as the quality degenerates, about in the same proportion does the smell vary, until it becomes positively offensive. This fragrance is dependent very much on the process of manufacture. Orange county dairy-maids make "Orange county butter" wherever they follow the same processes. The taste of the butter will betray any inattention to the proper care of either the milk, cream or the vessels in which they are kept. So will the addition of any foreign matter, such as impure, or too much, or too little salt, sugar or coloring matter. A certain amount of salt is necessary to bring out the true flavor of the butter in its greatest delicacy. In texture or consistency, a greater difference is seen than upon any other point. Some are firm, leaving no mark upon the knife after being thrust into a lump, with hardly enough moisture to dim its brightness, while other lots are soft, leaving greasy streaks upon the blade, and large drops of opaque liquid oozing from the newly cut surface. The existence of either of these signs gives sure indication of an imperfect if not bad process of making.

NUMBER OF QUARTS OF MILK FOR A POUND OF BUTTER.

The number of quarts of milk required to make a pound of butter varies very widely. By many trials in England, it is found that one pound of butter requires from fourteen to sixteen quarts of milk; that is, about one ounce from a quart, varying with the feed and the season. Although it may be true that the milk of a majority of the cows in this country would require an equal number of quarts to make a pound of butter, yet there are cows that will give a pound to four quarts of milk. Col. Jaques, of Massachusetts, and Maj. John Jones, of Delaware, both had a "cream pot" breed of cows, which we saw a few years ago produce this result. But we believe that it requires an average of fourteen quarts to a pound, and that is why farmers prefer to sell their milk when it brings over two cents a quart. At that rate a milk dairy-man cannot even afford to make his own family butter; he can buy it from a farmer, who cannot sell his milk, at a rate more economical.

Mr. William Buckminster, of Framingham, Massachusetts, in 1850 exhibited a Devon cow for a premium as the best butter-maker, with satisfactory proof of the following yield of milk:

In June and July last she filled a common milk pail, at night, as full as any dairy-maid would wish to carry; and on June 17 her milk weighed,

Morning and night, each		$34\frac{1}{4}$	pounds.
June 10, morning and night		$34\frac{3}{4}$	do
June 19, do	do	34	do
June 20, do	do	$32\frac{3}{4}$	do
June 21, do	do	$32\frac{3}{4}$	do
June 22, do	do	$30\frac{1}{4}$	do
June 23, do	do	$30\frac{1}{2}$	do

He also certified at the time she was offered, in October, that four quarts

of her milk, when fed on grass only, and that of an ordinary pasture, produced one pound of the finest yellow butter. "This cow," he says, "is one of the six cows owned and bred by me, whose milk has repeatedly yielded one pound of butter from four beer quarts. Her keep through the autumn of the three years of her milking has been grass feed only—no grain, or roots, or corn stover, having been given her."

This is the richest milk of any but Alderneys, and above their average. Mr. Wm. S. Lincoln, of Worçester, Mass., produced from one cow owned by him, in the spring of 1858, eighteen pounds of butter a week; and the cows that produce fifteen or sixteen pounds a week are not uncommon in that State. The "Oaks cow" yielded her owner nineteen pounds a week at the best, and nearly 500 pounds in the course of the season. These are extraordinary cases, it is true, but if one cow can do it others can.

Now, if these are facts—and who disputes them?—what are we to think of the quality of the judgment, sense, or economy of men who will keep cows on their farms for the sole purpose of making butter, at an average of one pound to fourteen quarts, when they could have cows that would give a pound from less than half that quantity? Let this fact be thought of, that it does take fourteen quarts of milk for a pound of butter, which might be made from four quarts. While this is a fact, it is not to be wondered at that Orange county farmers have quit making butter, notwithstanding the high reputation it had attained, and prefer to send their milk to New York from every farm within reach of the river or railroad. If the milk averages two and a half cents when sold, and it would take fourteen quarts to make a pound of butter, it would make the first cost of the butter thirty-five cents a pound, besides all the labor of its manufacture.

The *Homestead* says:

"Mr. Colt, of Norwich, keeps two cows, which, in the best of the season, furnish four quarts of milk daily for use, and make nineteen pounds of butter a week. The writer also thinks that an improved style of milk room would be quite as likely to increase the yield of butter as an improved breed of cows. If only an additional pound a week from each cow could be secured in this way, it would be a matter worth looking into by our farmers, and would greatly increase the yield of butter in the State."

Think of it, farmers, in every State. An additional pound of butter a week from each cow! What would be the aggregate? Can anybody tell? Can anybody think of the vast amount, and that it would be all clear profit? And it is just as easy as it is to do right instead of wrong.

Undoubtedly butter can be worked so as to keep sweet without packing. So can wheat be cut with a sickle and thrashed with a flail, but they are not great labor-saving machines.

With successful butter makers the churning occupies about half an hour. By increasing the temperature of the cream it could be done in one-half the time, but the quality of the butter would be much reduced. In winter, to facilitate the raising of the cream, the earthen pans for holding the mik are rinsed in hot water before use, and warm water is applied around them, not to heat the milk, but for a time to maintain its original temperature.

When the temperature of the dairy is less than 55 deg. Fahrenheit, the

milk will not ripen for churning, and in such case should be removed for a time to a temperature of 55 deg. The sudden warming of the milk will not always enable it to yield up its butter readily. One butter maker says: "Carefully conducted experiments prove that more butter is obtained from a given quantity of milk when set in pans partly filled than when full." This is in opposition to the theory of A. B. Dickenson.

A French chemist declares that butter may be made without churning, by the use of a filter made of white felt, in the form of a bag, in the four corners of which are inserted porous strings, like candle wick, to hasten off the fluid portion of the milk. The bag being suspended by the four corners, from twenty-four to thirty hours, the contents of the filter will be found to be of the consistence of "smear case" (soft cheese). This solidified cream is then placed in a linen bag, tied tight, and the bag kneaded like a roll of dough. In a few minutes the mass grows liquid, and the butter and buttermilk are separated.

One large butter maker says:

"I use a horse-power churn, of a capacity sufficiently great to make 120 pounds of butter. I always try the temperature of my churn before putting in the cream. If below 55 deg., I raise it to that point with warm water, and keep the cream as near that point as possible. As soon as the cream is in the churn I start the horse, and keep him moving at a steady gait until the butter is broken, or begins to gather in small lumps. Opposite the opening through which the cream is poured into the churn is an inch hole, which is stopped with a plug. When the butter is formed as above stated, I open this hole and draw off the buttermilk, then start the horse again, and keep him going until I gather the butter into a solid mass. This accomplished, it is taken from the churn and put into a tub prepared for it. I then weigh the whole mass, and transfer it to the butter worker, when it is worked over twice, after which I add one dessert tablespoonful of the very best dairy salt to every pound. I again work it well, so as to incorporate the salt thoroughly. It is again weighed into pound lumps and printed. The human hand is never allowed to touch the butter, nor is water ever used to wash it"

Of course it is sold immediately; if it is to be kept we think it must be washed.

BUTTER AFFECTED BY FOOD OF COWS.

The quality of all butter is so greatly affected by the food of the cows, that no one can make good butter, although he has good cows, if their food is poor. In summer there is nothing better than clover pasture. At any rate, the pasture must afford sweet grass, running water, and trees for shade and rest. A cow should be selected for her quiet disposition, as much as any other quality, for a butter-making cow; for milk alone this is not so important. If she has vicious propensities she cannot be cured by viciousness. In winter, clover hay, cured in the most perfect manner, is better for butter than any other hay. To this add slops once or twice every day, composed of bran, shorts, cut potatoes, corn meal partially cooked, and salt; and an occasional handful of bone meal, lime, ashes, or charcoal dust, will be found advantageous. Carrots are always good for a butter cow. Nothing should ever be given her that is not sweet enough

for you to eat yourself. And even that is not always good food for a cow, as turnips, cabbages and onions are considered good food for the table—they are not for the stable, if sweet milk is an object.

Then she must be kept in a clean, sweet-smelling stable, warm and dry, but ventilated. The same stable should be used in summer for milking, after which the cows may be allowed to sleep out, if it is such weather that they can lie upon the ground in comfort; and if not, keep them in until after milking in the morning. Every cow should know her own stall as well as a man knows his own bed, and they will soon learn to be unwilling to eat or be milked anywhere else. Food and care of the cow, and perfect quiet and comfort for her in every respect, are the first requisites in making good butter.

A stable can be kept sweet enough to lodge in by the daily use of plaster, charcoal, prepared muck, or an occasional sprinkling of dilute sulphuric acid or solution of copperas.

It is necessary for a full flow of milk to maintain a continual supply of albuminous food, while in the latter period of fattening such kinds of food are superfluous, and only tend to enrich the manure heap. There is one leading feature in his practice, to which the utmost importance is attached by Mr. Horsfall, an English dairyman—the maintenance of the condition of his cows giving a large yield of milk. This is done by the addition of bean meal in greater quantity to those yielding the most milk. He refers also to the effect of clover upon the supply of milk as known to all dairymen, the dry material of which is nearly as rich in albumen as beans, and the inference is drawn that "albuminous matter is the most essential element in the food of a milch cow, and that any deficiency in the supply of this will be attended by loss of condition, and a consequent diminution in the quality of her milk." He is of the opinion that "you can increase the proportion of butter in milk more than that of casein or other solid parts." Rape-cake seems more efficient for this purpose than linseed cake, the oily matter in this seed more nearly resembling that in butter than that of flaxseed. He also says: "It seems worthy of remark that a cow can yield a far greater weight of butter than she can store up in solid fat. Numerous instances occur where a cow gives off two pounds of butter per day—fourteen pounds per week—while half that quantity, probably, would not be laid on in fat if she was fed for that purpose."

These "English notions" are worthy of American attention.

BUTTER AFFECTED BY PACKAGES.

It is one of the greatest mistakes that butter packers make to put it up in bad packages. Let it be taken for an incontrovertible fact that, as a general thing, a dairy of butter of uniform quality may be packed, one-half in rough, untidy casks, and the other in neat, sweet looking firkins, of suitable and uniform size, and that half will outsell the other at least ten per cent. The purchasers of butter by the single package or by the hundred packages, are always influenced by the outside appearance. One of the reasons why western butter sells at a price generally under the market is because it comes in bad order. How can people expect first prices for butter in mottled rolls, packed in a dry-goods box or a flour bar-

rel? Such butter, when it arrives in New York, is denominated "western grease," and sells at a price corresponding with its name.

WHEN TO SKIM MILK.

The right time to skim milk is just as the milk begins to sour on the bottom of the pans. Then the cream is all at the surface, and should at once be removed, with as little of the milk as possible. That housewife or dairy-maid who thinks to obtain a greater quantity by allowing the milk to stand beyond that time labors under a mistake. Any one who doubts can try it. Milk should be looked to at least three times a day. The *Dairyman's Record* gives the opinion that the heating of new milk to near the boiling point, just after it is drawn from the cow, is preferable to allowing it to stand for a time before heating, and thinks both butter and cheese are improved by so doing, "because the animal odors which are objectionable would be expelled," and goes on to say that "tasteless and leathery" cheese is caused by manufacturing under too high a temperature rather than from high heating before manufacturing.

DUST AND FLY COVERS FOR MILK PANS.

To keep dust out of milk pans, make hoops of ratans or ash wood, a little larger than the tops of the pans, and stretch over and sew on them some thin cotton stuff that will not stop the circulation of the air, but will keep out the flies and mites, and when the milk is cool lay these covers on the pans. To keep out flies, use musquito netting or wire gauze instead of cloth. The wire gauze is a fine thing to cover all windows in fly time.

Some inventive Connecticut genius has contrived a portable ventilated milk closet, which, from the description, we should think a very good thing, but presume that any ingenious wood-worker could get up one a little different in form to answer the same purpose; and we recommend all families that keep but one cow to provide themselves with such a convenient ventilated milk closet, or one that will let fresh air in and foul air out, and keep the milk safe from pestiferous insects and vermin.

The following item shows the benefit of keeping milk cool:

"In sending milk to market, though it left the dairy perfectly sweet, it was often found curdled on delivery to customers. To remedy this the cans were cased with thick cotton cloth, and this was wet with salt water. In this way the difficulty was entirely obviated."

The place where milk is kept, churning done, or butter stored, should be absolutely sweet, clean, and deodorized of every smell. Water—cold water, and its liberal application—is an essential about the dairy house, and outside of it; upon everything ever used, hot water, soap and sand, and hard hand work, to make absolute purity, are the essential requisites to produce good butter. Every woman should assure all the "men folks," and often repeat it to them, that no woman can make good butter if the cows are not provided with suitable food. Recollect, food and shelter, airy, roomy, clean stables, summer and winter; none of your milking in the road, among the hogs; setting milk for cream when the air is scented with the effluvia of the hog pen, or any other than that of roses, mint and new-mown hay.

Food is the first, purity the second, temperature the third requisition in making sweet, yellow butter.

Every farm house should have a room for milk; solely devoted to that and nothing else. In very dry soils this can be made easiest and best in the cellar, provided it has a chimney ventilator of ample dimensions running to the top of the house, which can be easily made when building, and no milk room is perfect without such ventilation, and in our opinion the cause of bad butter is as much in the want of a suitable place to stand the milk, and a cool, sweet room to store the butter, as in the process of manufacture. It is all-important, also, that the milk room should be of an unvarying temperature, so far as it can be kept so without extra expenditure over the profitable advantage. An attachment to the ice house is the best place for storing the butter. The following is a very good plan for a family dairy room:

Build very convenient to the kitchen, but not adjoining, an eight inch wall brick building, eight feet by sixteen feet inside, with a door in one end and a window in the other, and arch it over ten feet high in the center, and plaster it all over outside with water-proof cement. The top should be covered with a coat of asphaltum, if to be had, or else sand and tar. Give the inside a coat of hard-finished plaster, and paint that well, so that it can be washed. Where there is a good chance for drainage, the walls may be dropped two feet below the surface, or the whole built into a hill-side, in which case there can be no door nor window in one end, but there can and must be a large chimney ventilator. Make the floor of cement or flagging stone, and, if not too expensive, use stone shelves, built in the wall. The outside is to be banked up with earth and sodded over, so as to form a grassy mound, forming a sort of cave cellar. A retaining wall must be built each side of the doorway, and a shed over it, with wire screened windows in the door for ventilation, the sash being hinged to swing down and fasten to the lower half of the door. The best way to make dairy shelves is to use strips sawed one by two inches and set so that the pans will stand upon their edges, or else place them wide enough apart to receive the bottom of the pan, having cross strips nailed in to support the sides, so that the pans would only touch at four points, and so cause the milk to cool quickly, and save labor in keeping the shelves clean; for a pan of warm milk set upon a flat shelf in a room a little damp, or when the shelf has just been washed, will generate mold—certainly more than when set on strips, as here recommended.

HOW TO MAKE WINTER BUTTER.

If cows are fed with roots, meal, or even whole corn, which, by the by, is only to be tolerated when corn is worth less than twenty-five cents a bushel, there will be no complaint of poor, white butter, unless the fault is in the churning or the keeping of the milk. Milk, in winter, should be kept about the same temperature as in summer time, and should not be allowed to stand unskimmed merely because "it is taking no harm." Take off the cream, and if it is not enough for an immediate churning, let it be kept cool and sweet till enough is accumulated, when, if it is necessary to sour it, it may be put in a warm place and done all at once. When put

into the churn it should be at a temperature of 62 deg., and if kept at that, yellow butter will be got in thirty minutes by churning moderately, if your cows have had a little salt every day.

Adjourned. JOHN W. CHAMBERS, *Secretary.*

August 26, 1862.

Rev. Joshua Weaver, of Fordham, in the chair.

The Plum Crop.

Mr. Robinson asked Dr. Trimble the prospects of the plum crop in New Jersey.

Dr. Trimble.—The plum crop in New Jersey this year is very good. The plum tree has a number of enemies. If a plum is rotten it will affect a number of its neighbors. I have a large bottle of curculio hatched this year from the apple. Many persons dispute that the curculio affect the apple. To test the question, I placed a quantity of earth in a barrel on which I placed a number of small apples; after the maggot was hatched it went into the ground; I then placed a musquito net over the barrel, and when the curculio arose from the earth they were caught by the net. I think if you allow the hogs to run in the orchards they will eat up every decayed apple, and so prevent the insects from hatching for another year. This year the apple moth is doing great injury to our fruit. From observation, I think the nectarine is the first choice of the curculio; next the plum. Some persons think they save their fruit by using washes of whale oil, soap, &c. I have no faith in it. The reason we have a crop of plums this year is, last season the weather was very dry at the time the maggot was in the ground, and so it dried up; and we have no curculio this year to speak about, and necessarily we have a crop of plums.

Mr. Robinson.—I found another employment for hogs, in a convesation with some Shakers from New Lebanon. They told me for several years past their crop of apples have failed. The last season they purchased some hogs and turned them into the orchard. The hogs rooted among the trees and became regular workers. Sometimes they throw a little corn round the trees—the hogs are sure to find every grain. The Shakers do not eat pork. I found the family I staid with ate very little meat.

Dr. Trimble recommended the use of chloride of lime for improving the flavor of butter that has become rancid. The butter is washed in several waters in which a small quantity of the lime has been dissolved.

The Grapes of the World.

Mr. Wm. R. Prince, Flushing, L. I., said:

It is a most astounding fact, on which the human mind may deliberately ponder, that God and Nature, when generating the Vegetable productions of our Globe, have ushered into existence Eleven edible species of the Grape in North America; none in South America but one edible species throughout the entire Eastern Hemisphere, and that one located in Asia;

whilst neither Europe nor Africa can claim the possession by Nature of any species whatever. The consideration of the why and the wherefore of this most striking demonstration of Nature in her wise and determinate purposes, we shall leave to a future occasion, when the opportunity may be afforded us of giving more amplitude to a discussion of such intense interest and importance as connected with the Economy of the Universe.

I may, however, be permitted here to comment upon the grossness of the error of calling either Italy or Greece "The Land of the Vine," as Nature herself presents to us by the mighty preponderance imparted to North America in the creation of her numerous species of the Grape; that our own Country is the only one of all Nature's realms which is entitled to so glorious an appellation, as is demonstrated by the bright and glowing Vinous wreath, which everywhere encircles her domain. We wish now to proceed to an investigation of the character and relative value of each of the Eleven species which God and Nature have apportioned to North America, all of which are comprised within the limits of our own Country; while some of our most southern species extend their area to the adjoining northern line of Mexico, bordering the Rio Grande. It will thus be seen that Nature has extended the domain of "The Vine," one of the most beneficent gifts of God, over an immense expanse, extending from 25 deg. to 45 deg. north latitude on the Atlantic side of our Continent, and probably covering an equal extent on the Pacific side of our vast Country, thus occupying an almost identical latitudinal area of the Western Hemisphere that it does upon the Eastern one.

The North American species are all Diæcious or Polygamous, the number of Males being apparently greater of V. æstivalis, Viparia, and some of the Texan species. This sexuality does not result from any abortion or unnatural defect in the organism of the plants, as has been inconsiderately supposed, but is in accordance with the normal characteristics of the respective species, and the positive creations resulting from a great natural law. They thus differ in their Class and Order from the V. vinifera, the one solitary species of the Eastern Hemisphere, by a physical condition which was unknown to Linnæus, who was in like manner ignorant of the important fact that the same sexual distinctions between the plants of the two Hemispheres existed in the Fragaria or Strawberry family.

I. VITIS LABRUSCA—FOX GRAPE.

Branches covered with a russet pubescence; Leaf very large, broad cordate, beneath covered with a white gray or russet down; Berry large, round, depressed or ovate, black, purple, red, or bronze white; skin generally thick, sometimes thin; pulp usually tough, more or less juicy, sweet or insipid, naturally of strong, musty, foxy flavor, but sometimes very pleasant; Cluster naturally, short and small, with but few berries, but the size of the cluster, and the number, size and quality of the berries, are greatly increased in many seminal varieties, some of which are entirely devoid of the musty flavor, or lose it at maturity; and some very sweet, with little or no pulp, or with a pulp that becomes soft, and dissolves when the berries are fully ripe. The berries of the natural varieties mature very early, say from the last of August to the middle of September. The numerous

seedling varieties ripen during the same period, and down to October. The Vine attains to a great growth, climbing the loftiest trees of the forests.

It is found in Upper and Lower Canada, growing in its natural state much farther north than any other species; and it also extends its area to the extreme Southern limit in which Nature has located any other species, it being found in Georgia, Arkansas, the Sierra, and the level lands of Texas, and along the northern line of Mexico, bordering the Rio Grande.

This is a most important species for us to perpetuate and enlarge by growing seedlings therefrom, on account of its great hardihood, amazing vigor, and robust character, in which it surpasses all other species, it being capable of enduring any cold and all vicissitudes of climate. In point of fact, this species may be considered one of Nature's most estimable gifts, as the varieties produced from it are not only suitable to form successful vineyards in the northern sections of our own Country, but to cover the most northern Countries of Europe with Vineyards that shall prove far more productive than the best Vineyards of France, Italy and Greece. Such is the destiny of this and of other American species of the Grape, as I stated eighteen years ago in an article then published in the Gardener's Chronicle, of London, but which was assailed, and all American Grapes condemned as worthless by Prof. Landley, its Editor, whose plethoric perversity in ignoring everything American thus succeeded in retarding European advancement in the general culture of the Vine until the present period. This species was introduced to Europe in 1656, together with V. æstivalis. What has Europe lost by 200 years of neglect to cultivate these Vines, so congenial to her climate, and so immensely superior in product of fruit and of wine to the V. vinifera, introduced from the East?

II. VITIS ASTIVALIS—CLUSTER GRAPE.

Leaf broadly cordate, three to five lobed, more so than the Labrusca, young leaves with russet cobweb pubescence beneath; cluster oblong compound, with more berries than the preceding species in their natural state; Berry small to medium, deep blue or purple, but seminal varieties have been produced of other shades; skin thin; pulp tender or dissolving at maturity; flavor more acid, but also more vinous and sprightly than the preceding, often very pleasant and quite juicy; growth vigorous, attaining a lofty height, often sixty to eighty feet on trees in the forests. It is an admirable species for its vinous qualities, from which we have already obtained many most admirable varieties suited for vineyards and the dessert. Its northern limit is Connecticut, but it extends its domain southerly to Arkansas, Florida, Texas and New Mexico. Its range is with labrusca along the Atlantic States and further to the West.

The different varieties mature their berries from the latter part of September and throughout October.

III. VITIS CORDIFOLIA—FROST GRAPE—WINTER GRAPE—CHICKEN GRAPE.

Leaf cordate, acuminate, variable, glabrous on both sides; Cluster loose, usually many berried; Berry small, black or blue, thin skin, acid or acerb, but pleasant after touched with frost. Some seedling varieties are sweeter and of very good quality. The vine attains a length of forty to fifty feet, and is of the most hardy character, ripening its fruit the begin-

ning of October, which will hang on for a long time. It is found in Upper Canada, and extends south to Arkansas and Florida. This is the V. vulpina, of Linnæus, Wildenow, Walter and Eaton. Torrey and Gray have erroneously supposed the V. vulpina of Linnæus to refer to V. rotundifolia.

IV. VITIS RIPARIA—WINTER GRAPE—FRAGRANT GRAPE.

This species has also been named V. odoratissima, on account of the Mignonette fragrance of its flowers. Leaf coarsely, unequally, but deeply toothed, or acuminate; somewhat trilobate; thin, smooth on both sides; veins and petioles pubescent, very distinct in foliage and fruit from V. cordifolia; Berry very small, round, deep purple, acerb, dark juice, two to three seeds; cluster small, loose, with a few scattering berries of no value; flowers both diœcious and polygamous; growth exceedingly vigorous and rampant, will speedily cover a large area, and very suitable for shady bowers. It is found in Upper Canada and around Niagara Falls, where I found both sexes, and South to Arkansas, and in the Western States. Its location is usually on the banks of rivers and smaller streams.

V. VITIS ROTUNDIFOLIA—MUSCADINE—BULLACE—BULLET—SCUPPERNONG.

This is the most peculiar in its foliage and general character, and would not be supposed a variety of the edible Grape family by any casual observer. It forms an immense vine, either lofty or horizontal, and there are Vineyards in North Carolina where four vines cover an acre. Leaf cordate, unequally toothed, smooth and lucid on both sides; Berry large, black, deep purple or white, coriacious, sweet, of good flavor, makes a Wine of the most exquisite aroma, equal to the finest ever produced in Southern Europe; Raceme or Cluster comprised of numerous umbels of four to five berries each; branches smooth, gray, and slightly verrucose; very ramified. Some varieties are acid or indifferent, others excellent, especially the White Scuppernong. It is seldom met with at the North, although we have cultivated it for thirty-five years on Long Island, and have found it to succeed perfectly, and to be exceedingly productive, the berries free from pulp, and the White variety equally good as the Chasselas.

This species is not found growing naturally North of the Potomac, but is plentiful throughout North Carolina, and South to Florida and Texas, and in several of the Western States.

VI. VITIS CARRIBEA VEL INDICA—CARRIBEAN GRAPE.

Leaf small, round, cordate, upper surface smooth, under gray down; Berry small, dark purple or black, sour, acid, usually unpalatable, but sometimes agreeable; a high climber; native of Florida, Arkansas, and to the Southern limit of Texas and the Carribean Islands. There are many male plants which have, of course, infertile germs, and consequently cannot produce fruit, such being in perfect fulfillment of their sexual character.

VII. VITIS CALIFORNICA—CALIFORNIA GRAPE.

Leaf subrotund, large toothed, entire or lobed, smooth above, tomentose beneath; Berry small, black, moderately juicy, assimilates to V. cordifolia, but distinct, and ripens in summer. Vine of vigorous growth; usually

found on the borders of streams. We have it in bearing on our grounds. It is of most vigorous growth, and will ascend thirty to forty feet or more, and spread its branches in proportion.

VIII. VITIS MUSTANGENSIS—MUSTANG GRAPE.

Berry large, black or dark purple, thin skin, pulp red or white, very acrid red juice, four seeds, edible, not unpleasant when fully ripe; Cluster compound; Leaf dark green, rather smooth and glossy above, with a dense woolly pubescence beneath; branches, petioles, peduncles and pedicels almost covered with white down. It makes excellent deep colored wine, resembling Claret; grows abundantly in rich soils in Texas, and especially along the banks of rivers; of gigantic growth, being the largest growing Vine of Texas; flowers are both diœcious and polygamous, hence male infertile vines are often seen.

IX. VITIS RUPESTRIS—ROCK GRAPE.

Leaf small, reniform, cordate, incisely toothed; Berry small, black, rather acid, thin skin, tolerably good; growth bush-like, erect, only four feet high, seldom trails; Cluster compound, erect; grows in the rocky beds of streams that are dry in summer; found only in the hilly country north of Austin, and in New Mexico, and matures its fruit here at the end of September.

X. VITIS MONTICOLA—MOUNTAIN WHITE GRAPE.

Leaf entire, cordate, crenate, upper surface nearly smooth, under side and petiole downy; young branches slender, tomentose, trailing, or climbing on bushes to the height of four to six feet; Berry large, white or amber, thin skin, pulp sweet, tender and juicy, from one-half to three-quarters of an inch in diameter; Cluster very compound. It grows on the hills and mountains northwest of Austin, Texas; ripens its fruit there in August, and here in September.

XI. VITIS LINSECOMII—POST OAK GRAPE—PINE WOOD GRAPE.

Leaf very large, smooth above, rusty pubescent beneath; Berry large, deep purple, thin skin, tender, juicy, slightly acid, pleasant; Cluster compound; the vine trailing, or climbing four to eight feet; native of Texas, exceedingly productive, ripens its fruit there the beginning of July, and here in August.

XII. VITIS VINIFERA—PERSIAN OR ORIENTAL VINE.

This is the only edible species which Nature bestowed upon the Eastern Hemisphere, unless the Yeddo Grape should prove to be a distinct species, and not a mere variety. This classic species, so long symbolized as "The Vine," like its American congeners, covers in its native regions a large portion of the Northern Temperate Zone, comprising nearly the same degrees of latitude, extending from 26 deg. north through Persia, Cabul, and throughout the entire Caucasian chain of mountains, to their northern limit on the Black Sea, and beyond that Sea into the Crimea up to 46 deg. north. It is also found in Syria and Palestine, Lat. 31 to 37 north. It is somewhat surprising that at this day we should witness a statement by a writer in the Patent Office Report for 1861, that "The History of the Grape Vine shows that it is a plant of a hot Zone," when, in point of fact,

no species of the Grape has yet been found growing naturally in any Tropical region, and none will flourish there except in high mountain ranges where the atmosphere assimilates to that of the Temperate Zone.

Without discussing any further the primitive history of "The Vine," and its progressive dissemination during the earlier periods of its history, we will commence with its introduction to Europe. It appears that the Phœniceans, who possessed an extensive commerce throughout the Mediterranean, introduced the Grape from Syria and Egypt some centuries before the Christian era, into the isles of the Archipelago, and afterwards into the Island of Sicily, and into Greece; and lastly to Italy, Provence, and by the Phocian colony into the territory of Marseilles (France), and to Spain.

When the first Vines were brought to France they would scarcely sustain the winters of her Mediterranean shores. Gradually, however, by extensive seminal reproduction, under the fostering care of the French Government, it has become acclimated to every part of that country, as well as to Switzerland and Germany. It has required 2,000 years to so acclimate the Vitis vinifera as to render it susceptible of successful culture in the countries where vineyards now exist in Europe. But after attaining this favorable result in the culture of the Persian Grape, the vignerons of northern and middle France, Switzerland, Belgium and Germany, find it necessary to prune their vines to the size of a currant bush, and these do not produce one-third the quantity of wine per acre which can be obtained by the culture of the very hardy and robust American species and varieties, natives of the northern and middle sections of our Country.

A Way to Grow Grape Vines.

Dr. S. J. Parker.—An advantageous method of getting a large growth in grape vines during the second year, is the following: put your vine, one year from the single eye or bud, in a pot eight inches in diameter at the top, and nine or ten inches deep, about the first of February, which is the best time of the season for starting early tomatoes, vines, etc. Prepare your pot by filling it half full of fresh horse manure; crowd down the manure so as to fill one-third of the pot; now put in soil, half rich garden earth, and half sand. Sour leaf mold or peaty mold will defeat your attempt, therefore use your best garden soil. Spread out the roots well in this soil in the pot. In a warm spot in your grapery, or other spot where the air is warm, the vine will start from the bud at or near the ground, and grow vigorously, according to its strength, from one to five feet, by the middle of May. Now lessen the amount of water and heat and sunshine, and put your vine to rest, so that it shall grow no more while in the pot. Let there be a rest of from four to eight weeks, as perfect as possible, by having the earth almost as dry as powder, and as cool as forty degrees of the thermometer, and putting it where it will not have direct sunlight, watching the leaves so that they do not droop much nor turn very yellow —let them turn a little and look dingy, and the wood of the vine turn dark, or ripen, just as you ripen wood in a grapery in the fall of the year. Now, having rested your vine a month or six weeks, carefully prepare your permanent site for the vine, by digging it deeply and manuring it. Take your pot and invert it; shake out the earth and vine in your hand by tap-

ping the edge of the pot on some hard substance; carefully set out the ball of undisturbed earth and roots from your pot in its permanent site; water freely, and in a couple of weeks it will start for a fine second growth, and you will be delighted with the stout growth the vine will make during July and August, and see it ripen its wood in September and October. By this means you gain a full year's time without injury to your vine.

We have an Ontario vine, treated in this way; its main vine is now, August 7, eight feet high, and the layer, from near the roots, has four laterals rooted, each about two feet high, besides the end of the layer, four feet high, and the vine growing at this date so as to daily note its progress. Same of Red River, of Arkansas, from the Patent Office last year, a perfectly hardy grape and a rampant grower.

Grafting the Grape.

The most successful way to do it is to dig up a root of the Isabella, as that will grow anywhere south of Canada, and cut it in lengths of three inches to a foot long, according to the rapidity with which the vine is desired to be grown; insert the scion into the upper end of this root stock. This can be done at any time of the year, but early spring is the best for this mode of grafting, whether for pots or to be put out in the open soil on "borders,"—that mysterious word to most farmers, but which means any suitable fence out of doors, in its common acceptation. A friend of mine is very successful in grafting; he recommends one year old Isabella vines, not pieces of roots.

VINE LAYERS FOR SUMMER TRANSPLANTING.

Perhaps it is not generally known that a vine layer can be established and transplanted to its permanent site, and acquire a strong roothold in its chosen permanent site, during one season.

I have repeatedly done it in the following manner: I take a large pot or box, suited in size to the branch of the vine I wish to layer, say a box about a foot or eighteen inches square and ten inches deep; I then take as much fresh horse manure, if not three days old so much the better, and fill the box half full when trampled down as hard as the foot will do it. I then fill the rest of the box with one-half good earth and one-half sand mixed thoroughly and put in lightly, having beforehand sawn a notch two or three inches deep down one end of the box. I lay the vine in the notch and through the soil over the manure, curving the branch up and out of the soil near the end opposite the notch. This covers the vine, but does not allow the branch to touch the manure; a hooked stick holds the vine under the soil.

The gentle bottom heat, caused by the manure, at first makes the layer readily root and afterwards the manure holds plenty of moisture and nutriment for the young roots. If the weather is warm, in a week the layer may be cut half off of the original vine, and in two or three weeks more, by degrees, be completely separated from the parent vine. Say you start your box by the 1st of June; by the 15th of August you can take your box to the prepared permanent site, lay it on its side, take the bottom off, and as you right the bottomless box the soil will be loosened from its sides,

when the sides and ends can also be taken off over the now strong layer, and the vine is in its permanent place and will make strong roots into the surrounding soil before winter; mulch the ground well the first fall and winter.

On motion of Mr. Robinson, the Club adjourned until the 7th of October.

JOHN W. CHAMBERS, *Secretary.*

October 7, 1862.

The regular weekly meetings of the Club were resumed to-day.

Mr. John P. Veeder, of Albany county, N. Y., in the chair.

New Drain Tiles.

Mr. David S. Ogden, 93 Wall street, New York, exhibited a machine for making drain tiles, and also several specimens of tiles made from Rosendale cement and sand. They are made with a bore from two and a quarter inches to twenty-four inches in diameter. Persons who use this tile very much approve of them. The price of the two and a quarter inch tile is fifteen dollars per thousand; each piece is twelve inches long. They can be laid with a very small inclination, as the bore is made with mathematical accuracy.

Mr. Carpenter asked if these tiles were affected by frost.

Mr. Ogden.—If the tiles are properly laid, the frost has no effect upon them; cement tiles increase in strength by age. I have been in the cement business for years, and have had great experience in selecting the best qualities of cement for this purpose.

Mr. W. S. Carpenter.—I consider the subject of drainage of the greatest importance to our farmers. They are now becoming convinced that drained land produces larger crops than land not drained, and the crop is more reliable. A neighbor of mine has laid seven miles of drains, and he says his crops have been considerably increased thereby.

Mr. John G. Bergen.—I fully concur in the remarks made by the previous speaker. Draining is very little understood by our farmers. It is a very simple affair. Drains, in my opinion, should not be more than thirty feet apart, and should be laid about three feet deep to protect them from frost. It has been thought by some that hilly land does not require draining, but it has been found by experiment that all kinds of land are improved by laying drains. The air passing through the pipes very much improves the soil. I hope the subject will be fully discussed at some future meeting.

Profits of Pear Culture.

Mr. Wm. S. Carpenter exhibited thirty-five varieties of pears, and thirty varieties of apples. Some of the pears were new kinds fruited by him for the first time.

He said: My crop of fruit this year is very abundant. I sent six barrels of Bartlett pears to market last week, and realized sixty-one dollars for them. These pears had been kept in an ice house. Some persons think our list of pears too large, and that a dozen varieties are enough to raise. I think I have twenty-five kinds now on the table that are nearly equal to

the Seckle. The taste of our citizens for fine fruit is improving. My general crop of Bartletts I sold this year for six dollars per barrel, and that pays a good profit. I consider a pear orchard more remunerative than an apple orchard.

Mr. Lancaster.—At what distance should pear trees be planted?

Mr. John G. Bergen.—That depends very much upon circumstances. Where land is very expensive, as when used for city lots, I would plant dwarf trees in rows twelve feet apart, and six feet from tree to tree Standard trees should be planted at least twenty feet apart each way, and dwarf trees might be planted between them, and left until the standard trees come into bearing, and then they should be removed or cut down.

The Chairman explained the manner in which he planted his trees, as follows: I do not make the hole as large at the top as I intend it to be. After the first spading has been removed, I dig under and make the hole of a conical form to the depth of from two to two and a half feet, according to the size of the tree, leaving the bottom of the earth crowning in the center for the purpose of taking off the surplus water from the heel of the tree. I then, with the spade, cut down the surface soil, and let it drop into the hole, which forms a bed for the tree to rest upon, making the earth very fine. If any sod is mixed with it I remove it to the outer edge of the hole. I then set the tree carefully, with the roots spread out to a natural position, first removing any of them that may be bruised or injured in taking up. The roots are then covered to the depth of three inches with fine surface soil, and the tree is to be shaken up and down until the fine earth has filled in all the interstices between the roots. I next add more surface soil and a small quantity of water, to cause the earth to adhere to the small fibres and roots. I then fill in more earth from the surface, pressing it down lightly with the foot, after which I fill the hole up, leaving the surface a little dishing.

The subsoil taken from the hole I distribute at some distance from the tree. By this means the tree is planted in surface soil entirely. I never trim any branches until the tree has stood one season. I have been very successful with the trees I have planted, having rarely lost a single one.

Prof. Nash.—The nice manner in which the Chairman planted his trees cannot be otherwise than beneficial. I agree with him in all except the use of the water at the time of planting, I once planted a peach orchard of 2,500 trees, and did not use any water. Water is apt to cause the surface to bake, if the weather should be very dry after planting. Some water thrown on the ground, away from the trees, would, perhaps, be of advantage.

Mr. Thaddeus Selleck, Greenwich, Conn., exhibited some pears, the grafts of which he procured at the Club from among some which had been received from the Patent Office. This is the first year they have produced fruit.

The fruit was tested by the members and pronounced to be the Flemish Beauty, although the color is lighter than that of those grown in this vicinity.

Isabella Grapes.

Dr. R. T. Underhill, of Croton Point, exhibited some fine bunches of Isabella grapes, which were pronounced to be very superior. The first grapes

were sent to market this year by him on the 18th day of September, and they have been sent every day since.

Dr. Trimble wished to know the price of Isabella grapes this season.

Dr. Underhill.—The market price of my grapes to dealers is ten dollars per one hundred pounds, and to families twelve dollars per one hundred pounds. They are retailed at fifteen cents per pound. The Isabella is a vigorous bearer, and requires considerable trimming out. Sometimes as many as three-quarters of the bunches should be taken off. My Isabellas ripen at about the same time as the Concord. Last week I visited an amateur cultivator, and found that all his vines had three times as much fruit on as they should have. His collection consisted of the Concord, Isabella, Diana, Delaware and Annie; but the grapes were not ripe, and would not be, for the foliage was nearly all gone. The principal reason why complaints are made against the Isabella is, that too many bunches are allowed to remain on the vines; remove these as soon as the bunches begin to set and you will hear of no more complaints.

Mr. Bergen.—What quantity of sugar do you use in the making of wine?

Dr. Underhill.—The Isabella grape will make a very fair wine without the addition of any sugar. It will depend upon the quality of wine you want. Different kinds require different quantities of sugar, varying from half a pound to several pounds per gallon. The pure juice of the grape should only be used in the manufacture of wine. All unripe and imperfect berries should be removed before being pressed.

Mr. J. G. Bergen.—I never grew good Isabellas until this year. I suppose I have been too timid in the use of the knife; but last season I employed a young man to trim my vines, and he cut a great deal of the wood away, and this season I have good grapes.

Dr. Trimble.—I was at Burlington, N. J., last week, and I there saw the Delaware grape growing in great perfection. Does any gentleman present know where the Delaware grape originated?

Mr. Bergen.—I believe that it originated in New Jersey, and was from thence taken to Ohio.

Dr. Trimble.—I think the marl has a great deal to do with the perfection to which these grapes grow at Burlington. I have never seen them so fine anywhere else.

Mr. Carpenter.—I tasted a very fine grape last week, which was given me by the Rev. Mr. Weaver, of Fordham; and I request that gentleman to give the Club a description of it.

Rev. Mr. Weaver.—The grape is called the Adirondac, and the original vine is now growing at the foot of the Adirondac mountains. Mr. Bailey, of Plattsburgh, was so much pleased with it that he purchased the sole privilege of propagating from it. The berries that Mr. Carpenter tasted were from the original vine.

Distribution of Seed Wheat.

The Hon. F. A. Conkling, member of Congress from this district, having presented the Club some packages of Tappahannock wheat, it was to-day distributed, with the request that the parties who received it would report the results to the Institute.

This wheat was procured by the Department of Agriculture of the Patent Office, and has been distributed extensively throughout our country.

The wheat is a native of Maryland, a winter variety, perfectly hardy, ripens fifteen days earlier than the Blue stem, and makes extra flour.

The following gentlemen received the specimens:

Dr. R. T. Underhill, Croton Point, N. Y.; Mr. John G. Bergen, Gowanus, L. I.; Mr. John P. Veeder, Guilderland, N. Y.; Mr. Jas. Geo. Campbell, Lawrenceville, N. J.; Mr. Wm. S. Carpenter, Harrison, N. Y.; Mr. S. H. Brown, Greenwich, Conn.; Mr. Griswold, New York city.

"Fruits in Season" was designated as the subject to be discussed at the next meeting.

Adjourned. JOHN W. CHAMBERS, *Secretary.*

October 14, 1862.

Mr. Adrian Bergen, of Long Island, in the chair.

Rev. Mr. Weaver, of Fordham, presented a pear which he wished to know the name of.

Mr. W. S. Carpenter.—It is the Vicar of Winkfield.

Rev. Mr. Weaver.—I bought it for another variety. There has been some mistake by the nurseryman of whom I bought it. What is the proper time for gathering this variety?

Prof. Mapes, cutting one of them to examine the color of the seeds, said: These are now ready to pick. This kind will ripen if picked when the seeds are brown; some other sorts would shrivel if picked before the seeds are black. That is the case with Duchesse d'Angoulême and Flemish Beauty. The Vicar of Winkfield is an excellent pear if kept in a cool fruit room until December, and then ripened about four days in a warm room. Pears never develop the best results if left to ripen upon the tree; an important chemical change occurs in the fruit while ripening within doors, developing a large quantity of fruit sugar, which is chemically different from that of the cane; the latter, by distillation, makes rum, while the sugar of fruit makes brandy. Pears should not be left to remain upon the tree until they begin to turn yellow, nor should they be pulled before sufficiently ripe, for then they will never perfect themselves; yet no certain rule as to time can be given when to gather any particular variety. The Duchesse d'Angoulêmes, upon the sunny side of my trees, are now ready for gathering, while those upon the north side of the same trees will not be ready for several days. It is of great importance to pear culturists to know exactly the right time to pick the fruit, for I have seen to-day in the New York market baskets of the Duchesse which were grown by a person who understood the art, selling at two dollars, while others were selling right by the side of them at seventy-five cents, simply because they had been gathered a few days too soon. I have grown the Duchesse this season with almost every pear upon the tree perfect, many specimens of which would weigh sixteen ounces each. The Napoleon pear, which fails in many places, and has been condemned by fruit societies, is an excellent

sort for cultivation upon all the red lands of New Jersey. It is highly important that all pear orchards should be thoroughly underdrained. There is nothing equal to wood ashes and soluble phosphates. Anthracite coal ashes are valueless except as a mechanical divisor in clayey soil. I have tried the experiment of using fusil oil and lime in the soil around pear trees, I think, with success, increasing the flavor. One of the most important things in pear culture is to keep the bark of the trees clean and healthy by the use of caustic soda-wash—one pound dissolved in one gallon of water.

Mr. Wm. S. Carpenter.—I am just beginning to learn how to cultivate fruit, although I thought I knew ten years ago. One great error is in allowing trees to overbear. There is no practice more profitable than thinning the fruit. The art of gathering is one that cannot be taught in books nor orally; it must be learned by practical experience. Farmers generally do not sufficiently discriminate in picking pears and apples. It is a common practice to commence upon one side of an orchard and gather clean as they go. I find it profitable to go over my orchard three times, at intervals of about a week. The proper season for eating the Glout Morceau, which is an excellent pear, is January.

Dr. Trimble, of New Jersey.—Gansill's Bergamot is one of our most delicious summer pears. It is very apt to be blown off before fully matured. I found this summer that some which were blown from the twig and fell upon spurs and lodged in the tree, where they remained until ripened, were much more delicious than those ripened in the house.

Prof. Mapes.—I doubt the necessity of thinning fruit if the trees are furnished with sufficient sustenance to perfect all the fruit that sets. At first, I allowed my dwarf pear trees to ripen twenty-five pears, the next year fifty, which some experienced men said would kill the trees, but the next year I had an average of one hundred, and one Vicar of Winkfield dwarf perfected over two hundred. The only manure used was superphosphate of lime; the soil was underdrained and deeply pulverized.

What is the Best Apple?

Mr. W. S. Carpenter.—I consider the Gravenstein one of the best apples grown.

Mr. Solon Robinson thought the Pomme Royal; this apple is also known by the name of Dyer and Bearburthen.

Mr. W. S. Carpenter said the Porter was equal to either, and a very profitable one as a market apple. All three are excellent.

The Adirondac Grape.

The Rev. Mr. Weaver, of Fordham, stated that he had just seen a letter from Mr. John W. Bailey, of Plattsburgh, which says that he shall have a few vines of this variety this autumn to sell at five dollars each.

Mr. Wm. S. Carpenter stated that Mr. Fuller, who has seen the original Adirondac grape vine, says it is a strong grower, with hardy leaves, better clusters than Isabella, ripening two weeks earlier, with berries as large as Black Hamburg. He also remarked that this grape would be a great acquisition to our list of fruits.

Mr. Solon Robinson.—I am glad to hear evidence that these berries grow naturally of that size, for the sample exhibited at Rochester was generally supposed to have been produced by the ringing process, and the taste of the berries confirmed that opinion in some degree, being, as I thought, quite watery, and lacking richness.

Pruning Grapes.

In answer to this question, Prof. Mapes answered: About the 25th of November; and as to how much to prune, he said: Cut away all unripe wood. The rule with all grape vines should be much root and little top, though many persons believe that fruit grown upon the end of a long vine is richer than that grown near the root. During the summer rest a dash of guano water will set them growing again.

Mr. John G. Bergen.—I think there is more in this winter killing that we know of. The wood is immature, but I have bunches of vines that have run into trees, the wood of which will ripen to the very end, while the wood of other branches of the vine is not ripe. I do not find what is called summer rest.

Mr. Solon Robinson.—I see some persons cut the leaves off their grape vines to ripen the fruit. I ask if this is the proper method?

Mr. A. S. Fuller.—Some very old horticulturists entertain the same opinion, and it is common now in Europe, where very sweet, choice fruit is desired, to train vines high. I would always prune, if possible, in November or December, and cut back to mature wood; and I would assist its maturing by summer pruning, though I would never prune off leaves so as to expose the fruit, because grapes thus exposed, though they may turn black earlier, will not be as luscious as those grown in the shade. As to summer rest, I find a number of my trees in July do stop growing for a time, and then take a second start.

Cranberries.

Prof. Mapes.—I have lately seen at Lakeland, L. I., upon high, dry land, sandy soil, a bountiful crop of cranberries. They are planted in rows, and cultivated between like other garden vegetables; there is no means of irrigation or overflowing, which I had supposed necessary to prevent destruction by insects.

Mr. Solon Robinson said that flooding cranberry beds was not for the purpose of killing insects, but for the purpose of keeping back the blossoming, so as to prevent the destruction of the fruit by late spring frosts.

Dr. Clark, of Burlington county, N. J., said there were many natural cranberry bogs in that county, and many new plantations making, but no crops yet produced upon dry land. Some wild ones grow upon land that is nearly dry, where no water stands, and where the flats are never overflowed. The information about cranberries among the old inhabitants is crude and untrustworthy, though the opinion prevails that they will produce 200 or 300 bushels per acre. The only fear, then, about a good crop is on account of spring frosts. At the present time a great many parties are planting cranberry vines.

Rev. Mr. Weaver presented some very splendid specimens of Camelia balsams, which were very much admired.

Adjourned. JOHN W. CHAMBERS, *Secretary.*

October 21, 1862.

Dr. Hawks, of New York, in the chair.

Profits of Grapes for Wine.

Mr. C. S. Middlebrook, a wine maker in Connecticut, says that if he could sell the pure grape juice at one dollar a gallon, it would afford him a large profit. He also thinks that sugar added, at the rate of one to three pounds per gallon, does not produce alcohol so as to increase the intoxicating power of the wine. He finds no difficulty in keeping pure grape juice, but he does in selling it, even at fifty cents a gallon, and had to send 300 gallons, after keeping it a year, to the distillery. It took eight gallons of wine to make one of brandy. He proposes to send samples of wine, if agreeable, to be tested.

We can assure him of the agreeability, and, also, that some members of the Club are decidedly good judges of good wine.

Destroying Gophers and other Burrowing Animals.

Mr. A. D. Gaylord, of Gaylordville, Connecticut, wants to know what it was that was recommended some time last year, to burn in the mouth of a burrow, to make a gas heavier than air, so that it would descend and destroy the animal.

Mr. Gaylord wants to destroy woodchucks, which he says have become a great nuisance in that part of the State; more than ever before. "They are destroying fruit trees—apples and pears. They are so numerous that our dogs cannot keep them down, and are constantly on the increase. Traps are too slow; I want something to get satisfaction sooner, and must have it, too, if it can be obtained. They are our worst pest in the country, mice not excepted. As they are graniverous animals, it is difficult to poison them in the fields where cattle or sheep are allowed, and all the traps in chistendom won't do it, as old ones will almost always dig out a new hole and avoid the trap. Something that will produce a gas that will descend into their holes and destroy them, would benefit the farmer thousands of dollars if made use of all over the States. Can you, or can any one, give me any information?

Mr. Solon Robinson.—The article was sulphur, which, in burning, produces a deadly poison to all animal life, and the article stated that if set on fire in the mouth of the burrow, and that covered over nearly air tight, the whole of the oxygen within would be consumed, and the lives of animals destroyed.

Grafting Grape Vines.

Dr. S. N. Rowell, of Malta, N. J., wants information about grafting grape vines. He says:

"The matter seems to me to be one of such importance that I, and probably many others, would like to see one or two points more clearly elucidated. Should the scion be cut in the fall or winter and preserved like those of the apple and pear, or must they be cut just before insertion? Again, what time in the spring should the operation be performed, that is, should it be done before or after the vine begins to put out leaves?"

Mr. Robinson.—The cuttings for grafts must be made from the trimmings of vines in November, or the winter months, which are preserved as for planting. The time of insertion is the same as for other grafts, that is, before the buds start.

Preserving Cider Sweet.

Prof. Horsford recommends sulphite of lime. He says:

"When the cider is undergoing a lively fermentation, add half a pound of sugar to each gallon, and let the fermentation proceed till it just suits your taste; then dissolve a quantity of sulphite of lime equal to $\frac{1}{8}$ or $\frac{1}{4}$ oz. to each gallon of cider and pour it in, and shake the cask thoroughly, and bung up tight. It will be ready to rack off, bottle, or use, in ten days afterward."

There is no doubt about the power of the sulphite to stop the fermentation and prevent the acidity, but the cider is very apt to have an unpleasant twang, which is felt some minutes after the cider is drank.

Various Fruit Wines.

Mr. Thomas Waring, of West Nottingham, Indiana, writes as follows:

"Now I have read in the report of the proceedings of the Farmers' Club, and elsewhere, that wines made with the juices of the various fruits, and sugar, are unwholesome beverages; and I think it was stated that even grape wine, to be wholesome, must be made without the addition of sugar. There are some things connected with these matters which are not entirely clear to me, and I doubt not there are others who labor under the same difficulty.

"Now what are the relative merits of currant wine, blackberry wine, tomato wine, sorghum wine, etc., with that made from grapes, which everybody can raise almost as easily as the foregoing? Whether, so far as health is concerned, they had better raise enough grapes to eat, and spend the rest of their time at something else; or if a little wine be a useful addition to their other stores? Whether they may increase its quantity by the addition of sugar and water, and if so, will such beverage be unwholesome?"

Mr. Solon Robinson.—Such beverages, used in very moderate quantities, would not be unwholesome. If used freely, as pure grape wine in Europe, they would not be wholesome. There is very little difference in the value, in any respect, of sugared fruit juice; that of grapes, however, is rather preferable, and, if necessary to preserve it, I would add a little sugar, and I would, if I had grapes in abundance, always have a bottle of the juice to use in the family or offer to a friend. I think we should all try to grow grapes of such quality as will make wine without sugar, and accustom our

tastes to what are termed "dry wines," and then we shall cease to have a taste for intoxicating beverages, such as are all the sugared wines, in a considerable degree, as well as alcohol produced by distillation of sugar or fruit juice.

Saving Apple Seeds.

Mr. F. K. Phenix, of Bloomington, Ill., sends very full directions for saving apple seeds, which have become an important article of trade, and are usually worth from $3.50 to $6 a bushel, and a load of pomace will yield one and a half to two bushels of seed, or the pomace of ten or twelve barrels of cider will yield a bushel, and four men, with suitable appliances, can get out ten bushels a day.

"A running stream of water is necessary, and some kind of machinery to agitate the pomace in a trough, which should be ten feet long, fourteen inches wide, six inches high, with a gate at the upper end to let in the water, and a sieve at the lower end to catch the pomace and let the seeds through into a box, which will hold them, but not the water. The fresher the pomace, the better it floats off; besides, if kept till it heats much, the seeds will be injured. It will spoil in two days' warm weather, unless spread to dry, and then it is better if first soaked, which loosens it so that it breaks up easier, which must be done in all cases before the seed can be separated. A cylinder somewhat like a threshing machine is used to break up pomace. Sometimes a pomace beater is extemporized out of an old fanning mill, by substituting a spiked cylinder and bed piece in place of the fan. The cylinder may be five inches in diameter, with some fifty spikes, two and a half inches long; and a plank one and a half inches thick, six inches wide, with twenty-penny nails driven through, will answer for a bed piece.

"The beater is set over the working trough, which has a steady stream of water, three inches deep, if possible, in which the broken pomace falls, and is agitated and washed, and the seeds have to be brought back and passed through again, and perhaps again. A simpler but slower mode is to soak up the pomace in a large vat or tub, stirring it thoroughly, and floating it off the surface, while the seed settles at the bottom. Drying the seed is also very important, as when fresh and wet it heats soon, thereby ruining the germs. Seed from old, partly heated pomace is more apt to spoil. After the seed is cleaned, spread thin in sun, and stir often to get the outside moisture off. Then spread in chamber or loft, with doors and windows open for free ventilation. In a well ventilated loft the seed spread thin would cure thoroughly and fast enough from the first. Curing wholly in the sun is deemed prejudicial to the vitality of the seeds. If not spread quite thin, the seed *must* be stirred thoroughly two or three times a day; the oftener the better, to prevent molding. Apple seed can doubtless be dried too much, but it is oftener the other way.

"Good, newly dried apple seed weighs forty-two to forty-four pounds to the bushel; older and more thoroughly dried, forty pounds. Seed from heated pomace is always more or less damaged. It may not be all bad, but is untrustworthy, and always higher colored than from good, new pomace. Seed got out good at first is made lighter by drying in the sun, or

may be got out of bad pomace and darkened by drying on a dusty floor. Good seed can generally be known by careful examination, after breaking or cutting off the husk. If good, the meat and germ are plump and of a clear, pearly white; if poor, it is of a paler, dirty white, or yellow color. If you have seed to buy, get of trustworthy dealers, and such have we found James A. Root, of Skaneateles, N. Y., to whom we are indebted for the above directions. One cider mill alone in this vicinity, running by water, turns out 2,800 barrels of cider per year when fruit is plenty."

In conclusion, Mr. Phenix makes the following pertinent inquiry, which is worthy of all attention:

"Why does not every one who can, select his fruit for seeds, especially for severe climates? Only the most hardy, vigorous, productive, perfectly formed seedlings should be chosen for that purpose. 'Like begets like,' and it must be that a few well conducted experiments of this kind would bring selected seed for apple stocks as much at a premium in proportion as are certain breeds of cattle or horses."

[From the Journal de la Société Impériale et Centrale d'Horticulture, Paris, 1862.]

Abstract of an Account of the Cultivation of the Vine, in single rows, adapted either to form Allies in Gardens, or to form Vineyards in high Northern Latitudes.

BY M. MARGUERRITTE, CHIEF GARDENER OF THE INSTITUTE OF NOBLES, AT WARSAW.

Warsaw is situated in latitude 52¼ deg. north. Its winters are at least as cold as those of New York. Its summers are very short.

From these causes, as the vine (of the old continent) is very sensitive to frost, it will not escape the rigors of a long winter unless it be buried in the ground during the whole continuance of the cold season. In this operation (called *couchage*) the vine, if planted erect, must be bent downwards at right angles, which operation often deprives it of its whole vitality, and always injures it materially. In spite of the care of the gardeners, cracks and ruptures take place, especially in the most vigorous, and what, therefore, otherwise be the most productive of the stalks. Those stalks which resist this injury will not, in consequence of the bending they are compelled to undergo, furnish a sufficient quantity of sap, which therefore with difficulty assumes its circulation in the spring.

Struck with this inconvenience, M. Marguerritte invented a new method of planting, by which, after a trial of several years, he is satisfied that he has perfectly succeeded.

The vines are set in a position in which the stalks make an angle of no more than 15 deg. with the surface of the ground. The plants are about 10 feet (3 m.) apart in the row, and if there is more than one row, the rows are about 40 inches (1 m.) apart.

Posts about three feet in length, and four inches in diameter, are set in the direction of the rows, having been previously charred at the ends, or coated with tar.

Between the posts galvanized wires (No. 15) are stretched. The lower-

most of these is about six inches above the ground. The second and uppermost about thirteen inches higher.

On planting the vine it is trimmed until no more than two well constituted eyes are left above the ground, and when the most vigorous of these has pushed out a shoot of six or eight inches in length, the other is pinched off, leaving no more than two leaves. This is done in order that the whole of the sap shall be thrown into the shoot which is preserved. The latter is fastened to the lower wire as soon as it is long enough to reach it. At the end of the first season, before burying the vine in the ground, it is separated from the wires, and the single stalk is cut off to the lenght of about one foot. The next spring, when the vine is uncovered, it is fastened again to the lower wire, and gently twisted in order that the buds, which develop themselves on the two sides, may send their shoots vertically upwards towards the upper wire, to which they are fastened when they attain that height and a sufficient woody consistence to permit it. They are pinched off at the first half above this height, and are not allowed to exceed this height during the continuance of vegetation.

As respects the eyes which throw out shoots, horizontally, they are fastened in that direction to the lower wire.

The pruning of the second autumn is performed as before, immediately before the vine is buried. Upon detaching it from the wires it falls, by its own weight, to the ground. All the lateral branches are cut down to two eyes, and the horizontal shoots to the length of 12 to 18 inches, according to their strength. The pruning of the succeeding years is performed upon the same general principles.

Treated in this way, M. Marguerritte obtained from his vines about four bunches for each running yard.

Abstract of a Report on the Cultivation of Asparagus, at Argenteuil, near Paris, by M. Gauthier.

TRANSLATED BY THE CORRESPONDING SECRETARY OF THE INSTITUTE.

The first cutting was sold 28th March. The beds were ten years old; the kind, *the ameliorated early rose of Argenteuil.*

The product was considered very large, but is estimated in a local measure, of which no dimension is given.

The plantations of 1861, from seed sown in 1860, were found to have given and taken more than a metre (39 in.) in height, while the best Dutch variety, sown at the same time and treated in the same manner, had no stalks longer than ten inches. The roots are planted in rows, between rows of vines, and the reporter infers that this method is much better than planting several rows in a bed. An accidental cutting exposed the roots of one of the rows, which had penetrated five feet into the ground.

The soil was a sandy loam, much enriched by long continued application of the street manure of Paris.

Rev. Mr. Weaver submitted to the Club some specimens of the Adriondac grape from Mr. John W. Bailey, of Plattsburgh, N. Y., and asks that it be

referred to the committee to examine the seedling fruit offered for competition for the premiums. It was so referred.

On motion it was resolved that a committee be appointed to examine seedling fruit.

Mr. Weaver, Mr. Carpenter and Mr. Fuller were appointed said committee.

Mr. John G. Bergen.—Forty years ago the Virgalieu pear flourished on Long Island; now it is nearly worthless. Many varieties of cherries that once grew finely there, are now all gone, and the same may be said of plums and several varieties of apples. The Newtown Pippin, which originated at Newtown, L. I., used to produce a good crop both in Kings and Queens county, but of late years the crops have failed; the Strawberry apple likewise, although I understand trees of both kinds produce fine fruit in Westchester county. I have just returned from Boston, where I went as a delegate of the Institute to the United States Pomological Society. The list of fruits approved by the Society are very much improved by adding the locations in which the various kinds flourish. The report, when published, will be very valuable to all fruit growers.

"Fruits in Season" will be the subject for discussion at the next meeting.

Adjourned. JOHN W. CHAMBERS, *Secretary.*

October 28, 1862.

Rev. Joshua Weaver, of Fordham, N. Y., in the chair.

A New Grape.

Mr. Francis B. Fanchar, Lansingburgh, N. Y., sends specimens of a new seedling grape, which he contends has more good points than any other native grape yet known, viz.:

1st. The vine has borne fruit about sixteen years, is a very strong, healthy grower; foliage large and abundant, and the leaves do not shed till late in the season; it is as hardy as the Concord, and has stood several years without protection and has never failed to produce a good crop.

2d. No vestige of rot or mildew has ever appeared, although other grapes in its vicinity have mildewed badly.

3d. The average time of ripening the fruit is ten days before the Isabella. The bunches will average in size the Catawba, most of the bunches having a shoulder.

4th. The fruit bears the frost well; no ordinary freeze will injure the fruit. The bunches sent were taken from the vines to-day.

It was referred to the committee on seedling fruit.

The following extracts from the Journal de la Société Impériale et Centrale d'Horticulture, were read:

Successful Method for Preserving Fig Trees during Winter, as Practiced by M. Engel, in the Neighborhood of Paris.

TRANSLATED BY THE CORRESPONDING SECRETARY OF THE INSTITUTE.

The method of preserving fig trees from frost, at Argenteuil, has hitherto consisted in trimming them in such manner as to form low bushes, having many low and flexible branches. These were covered with earth, without being taken up. This method is attended with difficulty in practice, and is only successful in the hands of skillful gardeners. M. Engel, on the contrary, removes all the lateral branches, leaving no more than a single shoot, which is trained against a support. During the summer, all new lateral branches are removed. In this way, instead of a bush, a little tree, eight or nine feet in length, is obtained, with a head charged with a vigorous foliage, and which, even in the least favorable years, yields an abundant crop of excellent fruit. When the autumn frosts begin, and the leaves turn yellow and fall, these little trees are taken up. Care must be taken to have the mold which adheres to the roots untouched, and carry it with the trees to the cellar or root-house in which they are to be placed for the winter. This must be deep enough to be unaffected by frost. The place where the trees are to be set is first covered with mold, and they are placed as closely as possible, with their trunks upright. The roots are then covered with earth, and the whole watered. If the cellar be dry, the watering must be repeated from time to time, as may appear necessary. But, if the cellar be damp, it will be necessary to ventilate it on such days as are warm enough to preclude the risk of frost. When the late frosts of the spring are over, the trees are replanted in the open ground.

Method of Forcing Grapes Practiced in Holland.

The gardeners of Holland pay the greatest attention to simplicity and economy. Of this, their method of obtaining grapes by *forcing* is a remarkable instance. The apparatus employed is a movable *hot-bed frame*, built of planks and joists, except on the front, which is of glass, and is inclined at an angle of about 40°.

During the month of November, or early in December, a vine growing in the open ground is selected for the purpose and covered by the frame, which is so placed that the earth in which the roots of the vine lie shall be either near the glass front or near the back of the frame. This will depend on the choice of training afforded by the manner of the growth of the vine, namely, whether it will be more convenient to train it in an inclined or a vertical direction. The space not occupied by the roots of the vine is trenched; the trench is filled with horse litter in a state of fermentation; the litter is covered with the earth dug from the trench, and they together form a mound whose surface is parallel to the glass of the front. The vine is protected from injurious gases and vapors by covering the mound with a continuous surface of oiled paper.

When the heat from the fermenting litter is nearly expended, a further supply is obtained by introducing boxes filled with a mixture of horse litter and leaves.

Ventilation is required from time to time, and particularly while the litter is fresh, to remove the offensive vapors.

The temperature is kept, during the two first weeks of the operation, as nearly as possible, at 60° Fahr. by day; not less than 53° by night. The heat is then gradually raised to 80° by day and not less than 65° by night. Grapes obtained in this way are said to be good. When the process is commenced about 10th November, the grapes are ripe about the end of March.

But little watering is required, but as the season advances, it is often expedient to shelter the vine from the noonday sun.

Mr. Wm. S. Carpenter.—I am pleased to see that our Corresponding Secretary has furnished these papers to the Club, and I hope he will continue those translations from journals of sister societies in foreign countries. They are very valuable for our Club, as they convey to us the improvements in horticulture in those countries.

Unnamed Apples.

A lady presented two choice, good apples, from the farm of David S. Woodworth, Lebanon, Connecticut, one of which, a medium sized red apple, was pronounced very excellent, and worthy of propagation.

The Vandyne Apple.

This is a local apple of New Jersey, and is thought to be superior to the Fall Pippin. Mr. Pardee presented specimens from Hackensack, N. J., which were tested and much admired. He said the tree is a great bearer, and the fruit is fairer and larger than the Fall Pippin.

Dr. Ward.—I think it superior.

Dr. Trimble said he thought the apple was generally known, as it is an old and much esteemed variety. It is truly described by Downing.

The Rambo Apple.

Dr. Trimble called attention to another very valuable Jersey apple—the Rambo. It is highly valuable, either for the table or cooking, and the tree thrives well upon light sandy land. It is medium size, flat; skin smooth and yellowish white in the shade, streaked and marbled with pale yellow and red in the sun, and speckled with large rough dots. Flesh greenish white, with a rich, sprightly, sub-acid flavor.

Thinning out Fruit.

Mr. Wm. S. Carpenter.—I think we allow our fruit trees to bear too much. I have tried an experiment this year, by thinning my pears, apples and grapes, and have found the advantage by so doing—my fruit is much finer. We find a difficulty in ripening the Easter Beurre in perfection, but by thinning the crop they are perfected in their growth. I have gathered this year some very fine specimens.

Mr. Bergen.—So far as relates to Isabella grapes I agree with Mr. Carpenter. This season I have fine Isabella grapes. A few meetings since Dr. Underhill produced Isabella grapes well ripened as early as any Con-

cord. The pear tree needs age to produce perfect fruit. I have an Easter Beurre tree on quince, seven years from the nursery, which never has produced good fruit until the present year, and but very few in number, but for the present crop about sixty full-sized pears. As to thinning out fruit, as a general rule that is correct; yet in a row of Duchesse, where all the trees have equal opportunity, some that have the least number have the poorest pears. On some trees that bore very full, he had many single pears of eighteen ounces weight.

The Chairman, the Rev. Mr. Weaver, of Fordham, said he had a Bartlett pear tree, eight years old, that produced for the first time this year. Those who have set trees need not be discouraged about final success, if the growth is good, if they do not produce immediately.

Dr. Trimble thinks in such a year as this that the tendency of all pear trees, and particularly the Bartlett, is to overbear, and should have the fruit thinned, and his practice is to make it doubly serviceable by selecting those that contain worms, which produce the codling moth; and not having any pigs, he fed these pears to his horse, which ate them with a good relish.

Mr. Wm. S. Carpenter.—I had some Glout Morceau pear trees, eight years old, which I had given up as barren, but have found that all they wanted was age, for this year they produced a full crop, The Vicar of Winkfield never produces good fruit upon young trees. I still adhere to the principle of thinning the crop. You will get better fruit than you will by letting the crop remain.

Grafting Grape Vines.

Dr. S. J. Parker, of Ithaca, N. Y., asks for information in relation to grafting grape vines. He says:

"I believe the 'book' recommended plan of waiting till the leaves begin to start, and then cutting the vine off two or three inches below the ground, and grafting it as if it were an apple or pear root, will disappoint every one, except in occasional instances; because the flood of sap prevents any union with the stock. The grafting as early as the frost is out of the ground, so as to allow one to dig this depth, and sheltering the graft from the late frosts—so that the thin scale of ice between the stock and scion shall not kill the cells of union, I believe to be more successful. But can any one tell a sure way, as sure as with apples, to graft grape vines?"

Grape Vine Insects.

Dr. Parker gives the following account of insect injuries to vines in his vicinity:

"There are at this place: 1. A green triangular bug about a quarter of an inch long, light wings, very thin, blunt, square forehead, triangular and slim body, behind the larger head. The little rascal loves to 'stop' just when you don't want it stopped on the vine, by eating out the tender growing end of the vines; he also girdles the young vines by a row of holes that swell up and partially stop the growth of the vine. It is similar to, but I believe not identical with, the *Ceresa Bubalus.*

"2. A scaly cover, one-eighth to one-fourth of an inch in diameter, with a mass of downy cotton under it, and covered by the scaly shell and cotton, is a gelatinous mass. The injury done by this is small.

"3. A small, scaly cover, not over an eighth of an inch long, and one-sixteenth of an inch broad, and about it the vine and leaves are disfigured by a black powder. The vines so infested grow slowly.

"4. A wart appears on the leaves, and is about as large as the half of a small pea, rough and green as the leaf. On opening the warty growth, if young, a yellow or brownish set, one to eight or ten, of minute egg shaped points are seen; on breaking these points or eggs open, a few red insects are found. If the warty growth is older the eggs or small tubers are broken, and the warty growth is full of lively scarlet or blood-red insects. Should this last insect rapidly increase it would destroy our vineyards. Can these be named? Are they common? Are they natives or imported?"

Dr. Trimble.—The insects alluded to by Dr. Parker are all common to the country.

Balsam of Fir Tree.

A correspondent wants information about this tree, which is one of the most beautiful lawn trees, and may be medicinally useful, as it affords a valuable product known as Canada balsam, which is obtained from little vescicles on the bark. The information wanted is: When to transplant from the nursery? How the tree should be set as to exposure? What soil is best? Is it naturally a dry land tree?

Mr. R. G. Pardee.—I think this tree should be transplanted in the last of May or in June, with all the earth that could be conveniently made to adhere to the roots, and planted in good loamy soil, with leaf mold or sand about the roots, and there will be no difficulty in making it grow.

Mr. Wm. S. Carpenter.—I consider it a very important point to keep the roots from getting dry. Thousands of trees are lost annually by allowing the roots to be wind dried. I plant them in May, June and July in well drained land with great success.

Mr. John P. Veeder.—I find bogs very convenient to place trees in after being dug up. It is a good plan to drive the spade in all around, so as to take up a cone shaped mass of earth, and keep the roots moist till it is reset.

Mr. Carpenter.—It is not important to take up balls of earth. Indeed, that is impossible when the trees are to be transported any distance. I had one lot of evergreens, the roots of which had been washed and then packed in wet moss, all of which lived.

Mr. R. G. Pardee.—Yet hardly one in a hundred from nurseries live. Why? It is because they are badly packed, or badly planted, or put into unsuitable soil.

Mr. Carpenter.—They should always be moved in a wet day, and kept out of the ground as short a time as possible.

Mr. J. P. Veeder.—I have had some valuable experience in transplanting trees from a swamp to a dry soil. I took up a wagon load of tamarack (larch) out of a swamp and set them in a wet place, and only four lived, and of those four, three were planted upon a dry, gravelly piece of land.

Next spring I tried again, and set all on dry land, and all lived. I have had the same success with elms, moving them from wet to dry land.

The Curculio—Why they did not Ravage the Fruit this Year.

A fruit grower in Massachusetts gives it as his opinion that a cold May will stop the ravages of the curculio. It did in 1860 and 1862, aided by frost in the fore part of June. Next year, if the spring is favorable for the production of these pests, he thinks we shall have them as thick as ever. The only way to get rid of them is to have all the fruit trees that are most affected by curculio planted in a lot where hogs can be kept. But it will not avail much for one man to pursue this course unless all his neighbors will do the same. In some cases the pests have been kept from trees by smoke of burning rags, leather, feathers, or strong smelling herbs, or with tar and sulphur fumes. Dried cow dung is also useful. The currant insect is also prevented by making a smudge under the bushes at the proper time in the spring.

Insect Eaters.

Mr. Solon Robinson.—We need more information about insect destroyers. We have made war upon birds, for some fancied injury they do to crops, without considering that they are natural enemies of insects—we hate the sight of toads, and kick them out of our path, without stopping to consider how many insects hurtful to the garden these toads have destroyed—we have a deadly enimity against skunks, and teach the boys and dogs to catch and kill, without stopping to consider that every skunk upon a man's farm is worth, annually, the interest of a hundred dollars. It is true, a skunk will eat an egg or a chicken. A mink or a weasel will do the same. What else will they do? Let us think. They certainly do not live upon eggs and chickens. No farm affords enough chickens and eggs to furnish food for a colony of skunks, but it does furnish bugs, worms, rats, mice and moles, which the skunks industriously pursue. The weasel is a most efficient ratter. I am not sure about him as an insect destroyer as I am of the mink. Insects are his natural food. I have heard of one man in Central New York who has a pen of domestic minks, which he undertook to breed for their fur, which he finds a profitable undertaking, but he has found another thing connected with this new kind of farm stock still more profitable. By keeping his minks and bees close together, he has found that they catch and eat every miller that comes near them. If a grasshopper sails into the pen he is snapped up before he touches the ground. Boys are much amused in feeding grasshoppers to the minks, which are as easily penned as rabbits, and much more useful, as they breed more rapidly and the pelts are valuable. Let us study natural history a little more. Let us learn, as we can, that in destroying some animals considered noxious, we have increased others that are really so. Let us learn that skunks, weasels, minks, toads, crows, robins, sparrows, swallows, martins, et genus omne, are not the farmer's worst enemies—they are all insect eaters and vermin destroyers.

An Improvement of Threshing Machines.

Cummings & Post, of Vienna, N. Y., exhibited a model of machine to reduce the power applied to threshing machines. Ordinarily the power is applied by a band to drive the threshing cylinder, and thence by another band to the shaker. The improvement in this machine consists in applying the power to the shaker by a short crank-motion, directly from the center of the driving wheel of the horse-power, which greatly reduces the amount of force required to perform the whole operation, as they have proved that the shaker can be easily driven by this mode by a boy weighing only sixty pounds instead of a power seven hundred pounds by the old method.

On motion, the improvement was referred to a committee consisting of Messrs. J. P. Veeder, John G. Bergen and J. H. Nash, to examine and report.

New Jersey Agriculture.

Dr. Trimble.—I have had an opportunity of seeing the agriculture of New Jersey, as shown by the various county fairs. As thus tested, I can not speak of it as I could wish to. With the exception of Burlington county, these fairs have not shown such a spirit amongst the farmers as would lead to that rapid development of this great art, that is now going on in many parts of the world. The State fair in Sussex county was unfortunate in the weather—a succession of wet, dismal days; such weather as will render any enterprise unsuccessful. The cattle, the sheep, and even the pigs, looked uncomfortable. The tents leaked—the tables were wet—the machinery, the fruits, flowers and vegetables were wet; and, worse than all to many who were there, *the track was heavy*. But the fair was prolonged, and the last day was bright, and then came the people. Some think an agricultural exhibition is successful just in proportion as it brings people together to see the trials of speed of fast trotting horses. When that becomes the only object, these fairs may as well be ended, as to any good they will do for agriculture. Let all the breeds of horses be improved to better fit them for usefulness, as we improve all other kinds of stock, but let us discourage this growing passion that values a horse only in proportion as he "can do it low down in the thirties." At this fair I saw a noble specimen of the Normandy horse, not for the track, but heavy and immensely strong, and white as snow. Those who have seen Rosa Bonheur's great painting of horses would think she had copied the prominent figure in her picture from this Jersey horse, the likeness is so exact. Many of the cattle at the State fair were very fine—Durhams, Devons, Alderneys. In some pens were specimens that would do credit to the herds of the best breeders in any country. Some Alderney cows were very attractive, they were such gentle creatures. The eyes of the gazelle could hardly convey a more tender expression. Tom Moore could have made poetry about those eyes, but I only thought of "strawberries smothered in cream." When I get a lot suitable for a cow pasture, that cow shall be an Alderney. The potatoes at Sussex were large to coarseness, looking inferior in quality to those at Monmouth or Burlington. The show of fruits did not indicate a general attention to that branch of agriculture in that section of the State.

The apple orchards everywhere were loaded almost to breaking down

this year, but generally in the upper counties of the State the fruit looked common. At Sussex, as at Warren and Somerset, were to be seen some bags of wheat, rye, oats, buckwheat and *flax seed*—all good—some of the wheat very fine. Some of the stock at Belvidere, Warren county, was the same at Sussex, and it was difficult to know which county was entitled to the merit. The sheep in Warren county we thought the best in the State, the Bakewell's especially, were very superior. Their fatness told plainly that the grasses of a hilly country are the best for sheep. The vegetables and fruit here were much the same as in Sussex. The scenery from the fair grounds at Belvidere is wonderfully beautiful. The finely cultivated farms, the rich green of the wheat fields, the Delaware river in front and the water gap in the distance, were more attractive to me than the petty strifes of the horsemen. The fair of Somerset county, at Somerville, was unfortunate also in weather—the last day was very wet, and I can say but little about it. If I could measure the agriculture of this county by the size of her pumpkins, she would be ahead of all the rest of the State. I saw some excellent stock—some machinery adapted to farming, of great value—the grain was excellent, but there was little to show progress in the cultivation of fruit. I never saw such a county fair as the one held in Burlington county, but was told that it was far inferior to those held in other years. The cattle this year were excluded on account of the cattle disease. But the horses were there, and such horses! They have a track on their fair grounds in Burlington county, as everywhere else, and it was in constant use, but the trotting there was not such a vulgar business as in other places. It seemed quiet, orderly, and comparatively respectable. Venerable Quakers were there, ladies were there. The farmers, their sons and daughters were there, interested spectators of the speed of their own colts. Even the jockies were held in check by the preponderating respectability. But the great superiority of Burlington county was shown in the buildings devoted to the fruits and vegetables. Such apples, such grapes and such potatoes, certainly cannot be seen anywhere else in our State, if in any other. The show of Delaware grapes alone, was worth the trip. Could this grape be grown in such perfection in other parts of the country (and we do not know why it should not be, unless the marl may have something to do with it), its cultivation will soon be universal, as it certainly is the best of all our native grapes. There was more fruit at the fair in Burlington county, than in all the other counties of the State together. Of the pears, the apples and the peaches, I not only met with all the new varieties, but all the good old kinds, that bring back such pleasant memories. From what I saw at this fair, I should judge that Burlington county is almost an agricultural Paradise. Marl has had much to do with causing this great prosperity, but these must also be careful, painstaking, industrious farmers, who are both practical and scientific. And *such* agricultural fairs are greatly useful.

Adjourned.

JOHN W. CHAMBERS, *Secretary.*

November 4, 1862.

Prof. J. A. Nash in the chair.

Truffles—Are there any in this Country?

Prof. Mapes called the attention of members, and he hoped through the published proceedings of the meeting to call the attention of people all over the country, to the subject of truffles, so far as to ascertain if there are any to be found upon this side of the Atlântic. He said that it was only within a comparatively short period that they were discovered in England. Formerly they were imported from the continent—now there is a home supply. We import about $12,000 worth a year, and they are retailed in this city at $1 a pound, and are used in cooking as a flavoring substance. One of the peculiarities about truffles is that they do not appear to have either root or stem. Gathering them is quite a business in France, Italy and Germany, and it is possible it may become so in this country. If they were more plenty and cheaper the consumption would be greatly increased. It is very large in Paris, but they cannot be artificially produced, as mushrooms are.

The Secretary read the following account of the truffle from Bryant's Flora Diætetica, a history of esculent plants:

"The truffle is a solid fungus of a globular figure, and grows under the surface of the ground, so as to be totally hidden. It has a rough, blackish coat, and is destitute of fibers. The manner of its propagation is entirely unknown. Cooks are well acquainted with its use and quality. It is found in woods and pastures in some parts of Kent, but is not very common in England. In France and Spain truffles are very frequent, and grow to a much larger size than they do here (England). In these places the peasants find it worth their while to search for them, and they train up dogs and swine for this purpose, who, after they have been inured to the smell, by their masters frequently placing some in their way, will readily scrape them up as they ramble the fields and woods."

A New Sweet Apple.

Mr. Eli Moore, of New Britain, Hartford county, Connecticut, sends a sample of the "flat sweet" apple, which is much liked by all who have tasted it. He says:

"It is a very valuable apple, but is little known excepting in my immediate vicinity. My farm, on which they were raised, and which has produced, probably, for forty years, more than all others (for they are little cultivated because little known), and for market they have the bare name 'Sweet,' is in Southington, Hartford county. It is an excellent cooking apple in various ways; and as for dessert, or eating raw, there are very few who do not like it. It is fine for baking, although the 'Lyman's Pumpkin Sweet' may have some characteristics which are preferable. It will make a good dumpling also, and as for apple sauce, we used it so many years as the only apple, that we in our family universally call it the 'sauce apple.' That was before we thought of picking them for winter. They are ripe about the first of October, beginning to fall off pretty fast,

and want picking about that time, and will keep nearly as well with me as the Greening."

Mr. Moore thinks that a free use of such apples would greatly improve the health of people.

The members present, after tasting Mr. Moore's apple, expressed themselves favorably toward it, but did not think it superior to some well known sorts.

Mr. Wm. S. Carpenter.—It is a good apple, but not as good as the Tallman Sweet, the flesh of which is more solid, and it flourishes excellently in this vicinity.

The Chairman.—I think that there is a deficiency of fall apples this year.

Prof. Mapes.—I saw, the other day, at a fruit dealer's, Gilliflowers selling at $1.12 per barrel. This variety is now fit to eat.

Mr. Solon Robinson.—I do not know of any sweet apple that is quite as good as the one which I have several times shown here, which I found growing upon my place without a name. Its only fault is its small size.

The Chairman.—I think the Golden Sweeting, in its season, the best that grows.

Mr. Carpenter.—In this vicinity I should recommend the planting of early or very late varieties. Fall apples do not in general produce such high prices as early or late kinds.

Barometers, their Construction, Cost, Use and Utility.

Dr. C. S. Osgood furnishes the following information about barometers. He says:

"What does your Club, or anybody that has used them, think of their utility to farmers? and shall I tell what their first cost is? But no matter, farmers in general ought to be told that it costs more to beat an understanding of the value and utility of things of this kind into their heads, so as to get them willing to pay for it, than it does to make it for them. Agents usually get about 33 per cent. for selling such articles, and make little enough at that, as I know by experience. I presume it costs as much more to properly advertise a new or little known article like the barometer, thus leaving the manufacturer but one-third the retail price for furnishing materials, making, risk, care, profit, &c., so that none need be surprised at the statement that all the essentials of a perfect barometer of the very best kind, and of whatever price, do not cost one dollar. The essentials hardly include the case at all, as all that is essential in that respect is a piece of board to hold the apparatus to. All there is of the least utility to a perfect land weather-indicating barometer is, and costs at wholesale, as follows, viz: A glass tube about one-half inch outside and one-sixteenth inch inside diameter, about thirty-six inches long, closed at one end, at twenty-five cents or fifty cents per pound. About one-half pound mercury, at about fifty-eight cents per pound. A small cup of any fine grained, seasoned wood, case of any kind, opened or closed, and a movable pointer or index, all necessarily costing but a few cents. The scale and vernier are of no use in prognosticating the weather. They are ornamental, and of use in determining altitudes,

but it is a thousand times easier to learn to make barometers than to learn to take altitutdes with one with any considerable degree of accuracy.

"The marine barometer has to be more expensively constructed to obviate the oscillation of the mercury which would otherwise be occasioned by the motion of the vessel; but the essential principle of action is the same in both, and is quite superior to the principle involved in the action of the Aneroid, Union, or any other. It is the principle discovered by Torricelli, over two hundred years ago, that, at the level of the sea, a column of mercury about thirty inches high will ordinarily balance the pressure of the air upon its base—the air not being permitted to press upon its top at the same time; and, when the air is heavier than ordinary, it will support a little more than thirty inches, and when lighter than ordinary, less than thirty, &c., so that it will be readily perceived by any one at all acquainted with the principles of natural philosophy (as all should be in my estimation), that this cannot be simplified, and all attempts at greater accuracy have failed with anything not too cumbrous for ready transportation. A liquid barometer thirty feet instead of thirty inches high, would, of course, have twelve times the range of the mercurial, and act on exactly the same principle, and have a corresponding delicacy or sensitiveness; but it would be somewhat inconvenient, though not so much so as might at first sight be imagined, as it could be arranged to examine at the bottom instead of the top. The old Torricellian barometer, while the most durable and accurate, I think must be the cheapest to get up of any kind that is good for anything. But the makers of those now sold have to pay for a patent on them, but which does not affect their utility one way or the other, but merely relates to an arrangement to render them portable without the danger of getting air into their tubes, which would render them useless till that was discharged. The portability apparatus is entirely out of use, except during transportation."

Mr. Solon Robinson.—This communication involves an important question, and one that this Club should carefully consider. Can we recommend these instruments to farmers as valuable weather indicators? According to my experience I should say no—that to any but well educated men, who have leisure to study and compare, a barometer is of no practical advantage.

Prof. Mapes.—The barometer at sea is a very valuable instrument; on the land it is of very little use. I have an hygrometer that I have used for the last fifteen years. It is made of two kinds of wood, one lengthways of the grain, the other across the grain. This instrument is nearly always in motion as the air is damp or dry, and by noticing the movement you will soon be able to understand it.

RULES FOR THE USE OF BAROMETERS.

Mr. Solon Robinson.—To those who have barometers and leisure to study and apply the rules, the following will be useful. Prof. Silliman gives the following rules, which embody the results of long and various experience in different places:

"1. When the mercury is very low, high winds and storms are likely to prevail.

"2. Generally, the rising of the mercury indicates the approach of fair weather; and its falling shows the approach of foul weather.

"3. In sultry weather, the falling of the mercury indicates thunder. In winter, its rise indicates frost. In frosty weather, its fall indicates thaw, and its rise indicates snow.

"4. Whatever change of weather suddenly follows a change in the barometer, may be expected to last but a short time.

"5. When the barometer alters slowly, a long succession of foul weather may be expected, if the column falls, or of fair weather, if it rises.

"6. A fluctuating and unsettled state of the barometer indicates changeable weather.

"In the above rules, the *index hand of the Aneriod* answers to the *mercury column* of the old barometer. Mr. Kendall furnishes the following rules:

"1. There is no point at which the barometer must stand to indicate rain or wind.

"2. The judgment must be governed by the rising or falling of the barometer.

"3. The falling of the barometer indicates the approach of a storm, the extent of which will be proportionate to the amount and rapidity of the fall.

"4. Showers. The barometer falls previously from four to twelve-hundredths of an inch, varying in time from one to three hours. The greater and more rapid the fall, the more violent will be the shower, accompanied more or less with wind.

"5. Northeasterly storms. The barometer falls previously from four to eight-tenths of an inch, varying in time from one to four hours, and continues falling until the storm arrives at its crisis, when the barometer begins to rise, and continues rising until that part of the storm which comes from the northwest passes off.

"6. Southerly storms. The barometer falls previously from one to four-tenths of an inch, varying in time from six to twelve hours. These storms generally precede unsettled weather; at such times the barometer continues low, and very slight additional depressions are followed by rain.

"A southerly storm is perhaps the most difficult to judge of by appearances, as they change so frequently without any real change in the atmosphere. During this class of storms, the utmost confidence should be placed in the barometer. After the first indication as above, and the barometer does not rise, but remains stationary, it is strong indication that the storm has not all passed.

"The foregoing rules are the result of long and careful observation. It must be remembered that storms occur under different circumstances in different parts of the globe; yet, taking the first three of the above rules as a basis of calculation, a short experience, with the exercise of the judgment, will enable one to determine very correctly concerning approaching changes in the weather."

Mr. Carpenter.—I have an Aneroid barometer on my farm, but find that it requires to be studied before you judge of the weather by its operations; but I think the farmer has signs enough to tell him the state of the weather, signs that have been handed down for generations.

Making Apple Butter.

A correspondent thinks that if farmers desire to prepare fruit for soldiers, there is nothing easier or better than apple butter—far better than dried apples for those who have no good conveniences for cooking them. To make good apple butter, take sweet cider fresh from the press, and boil two gallons into one; pare, core and cut into quarters sweet apples free from blemish. It will improve the flavor to add a few pears or quinces, if convenient. The cider syrup being skimmed and boilng hot, the fruit is added gradually, and must be stirred constantly until sufficiently cooked, when the whole will be homogeneous, and of a fine chocolate color. Constant attention is required to prevent burning. When well made it is entirely free from lumps, and about as thick as good mush. It may be kept in jars and kegs, in a cool, dry room for a long time, and is not injured by freezing. It is very common, indeed almost universal, among Pennsylvania farmers, and is considered a good substitute for butter, palatable and wholesome. For transportation, particularly to send to the army, it should be put up in soldered tin cans, or in wooden kegs like those that contain twenty-five pounds of white lead.

Putting up Fruit in Cans.

Mr. Wm. S. Carpenter.—It may not be generally known that with all our abundance of fruit, so cheaply grown in this country, we import large quantities of canned fruit from France. It is put up so perfectly that it will keep for years. They use very little sugar; and fruit thus prepared is doubtless far more healthful than that preserved wholly with sugar. As a general rule, in canning fruit in this country, sugar is so largely used that the natural flavor of the fruit is destroyed.

Prof. Mapes.—There are a few general rules upon the subject of canning fruit which need to be better understood. One is, that any fruit that does not naturally generate gas largely will keep with very little preparation. This is the case with tomatoes. They will keep with but very little cooking, and without the addition of any other substance, and with less care in preparation than almost any other fruit that is preserved in sealed cans. If tomatoes are slightly scalded and skinned, and put into bottles, and these set into boiling water for a few minutes, and corked and sealed, the fruit will keep as long as desired, and if eaten when first opened will have the same taste as when just picked from the vines. On the contrary, no preparation which you can give plums will keep them perfectly. Peas are of the same character; they cannot be kept fresh, however tightly they may be sealed, on account of the fixed air which they contain. Pears are very easily kept. I have Bartlett pears now in the house, of excellent quality, which were pared, quartered and cored, placed in bottles without anything added, and then placed in a water bath and heated nearly, but not quite, to the boiling point, and then corked and sealed. All that is needed in fruit easily preserved is to expel the air, to make nearly a perfect vacuum, which may be done by the air pump or by heat. It is not necessary to cook the fruit, nor is it ever as good when the heat is raised too high. Indeed, no kind of fruit should ever be cooked in sugar. In

making currant jelly the juice of the fruit should never be boiled in the sugar. Put the quantity of sugar into a wooden bowl, then simmer your currants over the fire; after skimming pour the juice over the sugar and stir it until the sugar is dissolved, and you will have a very superior jelly.

Mr. Charles Downing, of Newburgh, prepares a very superior article of peaches. The peaches are halved, fill up the center with sugar, and then set them into an oven, not too hot, some hours. When done they can be packed away for use. In canning fruit of any kind, care should be taken never to use any but the very best triple-refined sugar, and the fresher from the refinery the better, as the very best loaf sugar undergoes changes by exposure to the atmosphere.

Subject for the next meeting, "Canning Fruit."

Adjourned. JOHN W. CHAMBERS, *Secretary.*

November 11, 1862.

Mr. Wm. Lawton, of New Rochelle, in the chair.

Corn Cobs for Fuel.

Dr. S. J. Parker.—I know of no more convenient article for kindling coal than corn cobs. I was led to try it by seeing a farmer friend about to throw fifty bushels of corn cobs away. I requested him to give them to me, for I thought they would kindle anthracite coal, such as I was then using in my family. He replied, "you can have them; they are not worth much for anything; they lie all winter in the manure heap and don't rot; I cast them out on my meadows and fields in the spring, and they are the last things to disappear of the manure, so you can have them." They were cobs of corn threshed by the treading of horses' feet on them on the barn floor, and were thus broken about as fine as stove coal A load of them kindled my fires all winter, and my experience is that a cord of pitch pine wood, already cut and split, is not as convenient or profitable as a cord of cobs. Chemistry shows us that they are mostly carbon. Farmers' practical experience confirms the chemical record; so that wherever coal is used they are worth as much and more than split wood. A wisp of paper, or a few shavings, kindle them as readily as wood; they burn out rapidly, and leave a clear coal fire in a full glow.

Farmers' Ink.

Dr. S. J. Parker.—A very cheap ink can be made from the following materials, which can be purchased at any drug store for eight or ten cents. This ink will keep for years if not frozen, and is as perfectly permanent as any other in common use. Take one drachm of bichromate of potassa and half an ounce of extract of logwood, and one and a half gallons of rain water, or if you like an ink that flows easily. two gallons. Heat the water till it simmers but does not quite boil, add the extract of logwood, and as soon as it is dissolved add the bichromate of potassa; stir the compound five minutes with a stick, keeping all the while the water simmering, but

not boiling; strain through a cloth, and your ink is made. When cold, if too dark or thick, reduce with water.

Stone as a Mulch for Fruit Trees.

The Chairman.—Have any of the members tried the effects of stone as a mulch for fruit trees? I have tried it for some years with great success, although the opinion of my neighbors was against its use. Stones also placed around the stems of trees prevent them from being prostrated by the wind. They also keep down the weeds.

Mr. Wm. S. Carpenter.—There is another object in using stone. By the effects of the frost they give a great deal of fertilizing matter which nourishes the roots.

Dr. Trimble.—This has not been my experience in Newark. We had very fine elm trees, but since we have paved the streets we find the trees are dying.

Mr. Solon Robinson.—I am under the impression that the gas pipes have done more mischief than the paving. The gas escapes from the pipes and poisons the adjacent soil to a great distance from the mains.

Report on Cummins & Post's Improved Method of Operating Shakers of Threshing Machines.

The special committee appointed by the American Institute Farmers' Club, October 28, 1862, for the purpose of examining "improved method of operating shakers of threshing machines," as shown in a model exhibited by E. J. Post, Vienna, N. Y., report:

Having carefully examined the machine, we are fully satisfied that by operating the shaker by a direct connection with the main shaft of the motive power, independent of the threshing cylinder belt, and detaching the shaker from all working connection with the threshing cylinder frame, Messrs. Cummins & Post have made very great improvements.

1st. In economy of power by working the machine at a less elevation of the tread power, thereby greatly relieving the horses.

2d. In relief from jar, vibration and extra wear of the machine.

3d. In a more perfect separation of the grain from the straw by an equal and steadier operation of the shaker.

Respectfully submitted.

ADRIAN BERGEN,
JOHN P. VEEDER,
J. A. NASH,
Committee.

New York, *October* 28, 1862.

On motion, the report was adopted.

The Secretary read the following facts collected from the eighth census of the United States, 1860:

The value of flour and meal made in the United States in 1860, was $223,144,369.

The largest mill is in Oswego, N. Y., which in 1860 produced 300,000 barrels of flour; the next two are in Richmond, Va., making 190,000 and

160,000, respectively; the fourth is in the city of New York, which returned 146,000 barrels.

WHEAT.

The quantity grown in 1849 was 100,485,944 bushels, while in 1859 it was 171,183,381, showing an increase of nearly seventy per cent.

To the introduction and greatly extended cultivation of spring wheat in the Northwestern States, is the country mainly indebted for the increase in the amount of wheat produced.

In Illinois, this crop has increased in ten years from 9,414,577 bushels, to 24,159,500 bushels. In Wisconsin, in the same period, the increase has been from 4,286,131 to 15,812,625 bushels.

INDIAN CORN.

This crop in 1849 was 592,071,104 bushels, while in 1859 it was 830,451,707 bushels, an increase of more than forty per cent.

DAIRY PRODUCTS.

The quantity of butter produced in the census year 1859-'60, was 460,509,854 pounds, an increase of forty-six per cent. over that made in 1849-'50. The amount of cheese returned was 105,875,135 pounds. The quantity of cheese exported annually to foreign countries is about 15,000,000 pounds.

WINE.

The returns upon the subject of wine-making show a very large increase. In 1850, the quantity made was 221,249 gallons, to 1,860,008 gallons in 1860—an increase of 740 per cent. Ohio, California and Kentucky made nearly one million of gallons.

ORCHARD PRODUCTS.

The value of these products in 1849 was $7,723,186; in 1859 it had reached $19,759,361.

DRAINING.

This important improvement has made great progress in the estimation and practice of our farmers. Tile factories have been established extensively in many parts of the country, and, consequently, the material for making permanent drains is much cheapened.

Should the next ten years witness an equal advance in this direction, under draining will be regarded as among the most indispensable operations of the farm, and its benefits will soon be fully realized.

Underground draining involves an amount of wealth not yet appreciated, though rapidly becoming realized, by the American farmer. It is an undoubted fact that the most productive portions of our farms, and which are fertile in fevers, lie neglected and worse than useless for the want of knowledge, or the absence of enterprise. An assistant marshal in the State of New York, made report of one farmer, near Geneva, who had laid, on a moderate sized farm, some fifty miles of drain, and acquired wealth as the result. A single year's crop from land before useless, has sometimes paid all the expenses of the improvement, and the drains made twenty years ago are as efficient as when first constructed. For health and wealth nothing contributes more, where circumstances admit of it—and where do they not, to a greater or less extent?—than underground drainage.

ASSOCIATIONS AND EXHIBITIONS.

Among the means and incentives to improvement enjoyed by the farming community, we cannot overlook the influence of associations and annual exhibitions. These are not new, but they prove none the less useful; are now established in most of the States, and in almost every county of some of them. A somewhat new and important application of the association principle has been made in many towns and neighborhoods, by the organization of local societies or farmers' clubs.

The great advantage of the township associations consists in their adaptation to bring agricultural improvements home to all the people.

Productions of Agriculture, 1860.

Acres of land improved	163.261,389
do do unimproved	246.508,244
Cash value of farms	$6,650,872,507
Value of farming implements and machinery	247,027,496
Horses, number of	6,115,458
Asses and mules, number of	1,129,553
Milch cows do	8,728.862
Working oxen do	2,240,075
Other cattle do	14,671,400
Sheep do	23,317,756
Swine do	32,555,267
Value of live stock	$1,107,490,216
Wheat, bushels	171,183,381
Rye, do	20,976,286
Indian corn, bushels	830,451,707
Oats, do	172,554,688
Rice, pounds	187,140,173
Tobacco, pounds	429,390,771
Ginned cotton, bales of 400 pounds	5,198,077
Wool, pounds	60,511,343
Peas and beans	15,188,013
Irish potatoes, bushels	110,571,201
Sweet potatoes, bushels	41,606,202
Barley, do	15,635,119
Buckwheat do	17,664,914
Value of orchard products	$19,759,361
Wine, gallons	1,860,008
Value of products and market gardens	$15,541.027
Butter, pounds	460,509.854
Cheese, do	105,875.135
Hay, tons	19,129,128
Clover seed, bushels	929,010
Grass seed, do	900,386
Hemp of all kinds, tons	104,490
Hops, pounds	11,010,012
Flax, do	3,783,079
Flax seed, bushels	611,927
Silk cocoons, pounds	6.562
Maple sugar do	38,863,884
Cane sugar, hogsheads of 1,000 pounds	302,205
Cane molasses, gallons	16,337,080
Sorghum molasses, gallons	7,235,025
Maple do do	1,944,504
Beeswax, pounds	1,357,864
Honey, do	25,028,991

Mr. Carpenter.—The committee appointed to attend the Pomological Society, at Boston, have returned. I was much edified with the discussions on the various fruits presented. It was found difficult to make a list of fruits for general cultivation. Some kinds grow well at the south that

will not suit our locality; the same of those at the west; some kinds that were thought superior at one place are condemned at others. Some three years since, a committee was appointed to prepare a list of fruit suitable to different localities; a committee was also appointed to examine new seedling fruit, gentlemen well known in the country as practical fruit growers, such as Messrs. Barry, of Rochester; Wilder, of Boston; Reid, of New Jersey; and Downing, of Newburgh. I was pleased with Rogers' new hybrid grapes, and also with a new pear, called Clapp's favorite, a very large seedling.

Mr. R. G. Pardee.—I have attended several of these conventions, one held in Boston, and one in New York. I was not astonished at the exhibition of fruit; it is true they had a great number of specimens, but looking at it in a pomological sense, I did not see anything equal to the varieties I have seen at exhibitions in western New York.

To Have Green Corn in November.

Plant corn at several times until the 15th of July, before the frost comes; cut it and place it in great shocks, and you can have green corn in November as good as it was in August.

Mr. Carpenter.—There is a variety of corn twelve and fourteen rowed, called the Excelsior; it is one of the finest kinds of sweet corn I have ever grown.

Rev. Mr. Weaver.—From the description of this corn I must have been deceived in what I purchased for this variety, for mine was very hard and not very sweet.

Mr. Pardee.—It is necessary that corn should be planted a distance from other varieties; it hybridizes, and the seed planted grows a very superior seedling.

Mr. Carpenter exhibited several kinds of choice apples.

Subject for next meeting: "Pruning Grape Vines and Fruit Trees."

Adjourned. JOHN W. CHAMBERS, *Secretary*.

November 18, 1862.

Mr. E. Doughty, of New Jersey, in the chair.

Birds to which Guano Formations Owe their Existence.

The Secretary read the following extract made by him:

Mr. J. D. Hague, who was engaged more than two years, from 1859 to 1861 inclusive, by Mr. William H. Webb, of this city, for the purpose of studying the character and formation of their deposits, furnishes to *Silliman's Journal of Science and Arts* a very interesting article on the phosphate guano islands of the Pacific ocean, from which is extracted that portion which relates to the birds to which guano formations owe their origin.

From fifteen to twenty varieties of birds may be distinguished among those frequenting the islands, of which the principal are gannets and

boobies, frigate birds, tropic birds, tern, noddies, petrels, and some game birds, as the curlew, snipe and plover. Of terns there are several varieties. The most numerously represented is what I believe to be the Sterna Hirundy. These frequent the islands twice in the year for the purpose of breeding. They rest on the ground, making no nests, but selecting tufts of grass, where such may be found, under which to lay their eggs. I have seen acres of ground thus thickly covered by these birds, whose numbers might be told by millions. Between the breeding seasons they diminish considerably in numbers, though they never entirely desert the islands. They are expert fishers, and venture far out to sea in quest of prey. The noddies (*Sterna stolida*) are also very numerous. They are black birds, somewhat larger than the pigeon, with much longer wings. They are very simple and stupid. They burrow holes in the ground, in which they live and raise their young, generally inhabiting that part of the deposit which is shallowest and dryest. Their numbers seem to be about the same throughout the year. The gannet and booby, two closely allied species (*genus Sula*), are represented by two or three varieties. They are large birds, and great devourers of fish, which they take very expertly, not only catching those that leap out of the water, but diving beneath the surface for them. They are very awkward and unwieldly on land, and may be easily overtaken and captured, if, indeed, they attempt to escape at all on the approach of man. They rest on the trees whenever there is an opportunity, but on these islands they collect in great groups on the ground, where they lay their eggs and raise their young. One variety, not very numerous, has the habit of building up a pile of twigs and sticks twenty or thirty inches in height, particularly on Howland's Island, where more material of that sort is at hand on which to make their nests. When frightened, these birds disgorge the contents of their stomachs, the capacity of which is sometimes very astonishing. They are gross feeders, and I have often seen one disgorge three or four flying fish fifteen or eighteen inches in length.

The frigate bird (*Tachypetes Aquilus*) I have already alluded to. It is a large, rapacious bird—the tyrant of the feathered community. It lives almost entirely by piracy, forcing other birds to contribute to its support. These frigate birds hover over the islands constantly, lying in wait for fishing birds returning from sea, to whom they give chase, and the pursued bird only escapes by disgorging its prey, which the pursuer very adroitly catches in the air. They also prey upon flying fish, and others that leap from sea to sea, but never dive for fish, and rarely ever approach the water.

The above are the kinds of birds most numerously represented, and to which we owe the existing deposits. When the islands were first occupied they were very numerous, but have since been perceptibly decreasing.

Cuban Tobacco Grown in New Jersey.

Prof. Mapes presented a very handsome specimen of tobacco leaves grown by Mr. Quinn, at Newark, N. J., from Cuban seed, which produced at the rate of 1,100 pounds per acre. This tobacco is worth in this market about twenty cents per pound. The color of the leaf regulates the price. This growth is much larger than the same seed would have produced in

Cuba, where it is stunted, and the leaves so small that cigar makers find it difficult to work up a crop without buying wrappers. It is said that large quantities of tobacco grown in Connecticut is sent to that market to be used for that purpose. The finest leaf is grown in Canada, upon the shores of Lake Erie, and is used entirely for wrappers, the leaves being thin, silky and handsome colored. Large quantities of Cuba tobacco are grown in Florida.

Mr. Solon Robinson.—There it does not improve. It is almost equal the first year to that grown in Cuba; the second year it is not as good, and the third year only about one-quarter higher priced than common tobacco. The same results happen if seed is imported each year, and planted upon the same ground, and the best or highest priced tobacco is only produced upon certain soils.

Mr. John G. Bergen.—That is also the case in Connecticut. Other parts of the State will not produce such tobacco as that grown along the river; and only a small portion of that is such as sells for the highest price for wrappers. The great object in tobacco raising is to get the leaf of a uniform color.

Superior Winter Pears.

Mr. Geo. H. Hite, of Morrisania, presented some Lawrence and some Pass Colmar pears, in perfection for present use, grown upon dwarf trees in his garden. He stated that he could only induce the Colmar to bear by trimming on the spur system, and then the trees are productive, the fruit sound; and none can doubt, who taste of these, that the quality is excellent and fully equal to the Virgalieu.

Mr. John G. Bergen.—I have tried to grow the Pass Colmar, but I presume the nurseryman who sold me the trees thought that I could not, and therefore sent me Beurre Diel.

Mr. Quinn.—The Pass Colmar is a very good bearer when it gets age, and I must acknowledge that the quality is super-excellent, but the tree grows unsightly, and is apt to shed its fruit very often; the fruit also cracks. This is the reason it does not give satisfaction. The specimens shown by Mr. Hite are very fine, but with me the cultivation is not profitable. The Lawrence is a healthy grower, bears good crops, and the fruit is very sightly. It grows well on the quince.

Mr. J. G. Bergen.—I have found the Lawrence pear tree a very healthy and vigorous grower, either as a dwarf or a standard.

Mr. Doughty.—The great fault with my Lawrence trees is their overbearing.

Mr. Hite.—That must be remedied by thinning. It is just as important to prune off fruit as limbs.

A Valuable Connecticut Apple.

Mr. Joseph N. Hurlburt, No. 323, Broadway, presented specimens of a very handsome and very excellent apple, from Winsted, Conn., which was not recognized by any one present, including some good judges of fruit, such as John G. Bergen, Wm. S. Carpenter, R. G. Pardee, Geo. H. Hite, P. Quinn, E. P. Doughty, Dr. Trimble, Prof. Mapes and others, but was

admired by all. It is a handsome red apple, about the size and color of the Baldwin; flesh firm, yellowish white, and in flavor resembles Norton's Melon, which is one of the very best apples known, and has been more admired in England than any other American apple. It originated in East Bloomfield, N. Y., near where the Northern Spy originated, but grows well in this vicinity. This new apple from Connecticut is thought well worthy of extensive propagation.

The Chairman called the attention of members to the fact, and thought it should be made known extensively, that the standard of good apples has been very much elevated in this city within a few years; so much so that such apples as once sold at fair prices are now quite unsalable, except at very low rates. The most common buyers are learning to know and are willing to pay well for really first class fruit.

How to Make Trees Bear Every Year.

Prof. J. A. Nash inquired if there was anything that we can recommend farmers to do to their trees to make them bear every year instead of alternate years. He inquired the cause of this off and on bearing. Is it because one crop exhausts all the pabulum in the soil so that a year of rest is necessary to prepare a new supply? And, if so, will high manuring during the bearing year make the tree produce a good crop the next year, and so on regularly?

Prof. Mapes.—If part of the fruit is stripped off before it exhausts the tree, it will give it strength enough to produce another without any necessity of resting to recuperate. I am aware that it requires a great deal of moral courage to strip off this surplus fruit, particularly from a pear tree, when the owner knows that every pear that he perfects will bring eight cents.

Prof. Nash.—It is not the lack of courage with farmers, but the lack of time. They have no time to go into the orchard to thin out the fruit, or if they have they will be almost certain to neglect it. What is wanted is to know how to treat an orchard so it will produce moderately every year.

Mr. R. G. Pardee.—This was undertaken by Robert L. Pell, and he reported here that he had succeeded, but I think that he was mistaken. He pays more attention to the cultivation of his orchards than any other one that I know, and has the greatest number of trees, but he does not get a full crop every year. He plows his orchards to make the trees grow; he rarely plants anything in his orchards.

Prof. Mapes.—I have tried experiments to make trees bear out of their regular course, by using soda wash upon the bodies, and lime and salt and manure upon the roots, and though the fruit was increased, it was not enough so to make it profitable, though the growth of leaves and wood were largely increased.

Mr. Carpenter thought he had succeeded, by high manuring and good cultivation, in making some of his trees bear good crops every year.

Prof. Nash.—Suppose we put a bushel of ashes to each tree, and there is nothing better for an orchard, immediately after the crop is set.

Mr. Solon Robinson.—You cannot alter the result. A few simple facts will upset all theories about high cultivation and high manuring. You

cannot counteract nature. I would just as soon undertake by high feeding to make a hen lay two eggs a day as to make an apple tree bear full crops every year. As to the cause being an exhaustion of the soil, so that the tree is only able to produce a crop every other year, that is answered by numerous cases on the western prairies, where the soil is forty feet deep, and absolutely inexhaustible, and where trees commence bearing very moderate crops, and not exhausting ones, and go on bearing a full crop one year, and a very sparse one the next, just as nature's great law had predetermined, and which man cannot alter.

Prof. Mapes.—From my own experience and from the experience of others, the apple and pear tree has produced crops yearly.

Mr. John G. Bergen.—My father tried that experiment pretty well without success. In my opinion, if a tree begins to bear full upon an even year, say 1850, it will always bear even years; and even if it should not bear a crop for half a dozen years, when it did, it would be upon the even year; and no tree that naturally bears full, alternate years, can be made to bear as full upon the odd years. The Newtown Pippin, with me, used to bear good crops every alternate year. You can never change the bearing year; though I perfectly agree with Mr. Carpenter, that the better the attention paid to an orchard, the better will be the result. An application of manure to trees during the bearing year will be too late to affect the next crop, as the fruit buds are previously determined.

Mr. Pardee.—I would ask Prof. Mapes whether, if the soil is constantly stirred, it would serve as a summer fallow.

Prof. Mapes.—I am glad that question has been asked. Mr. Smith, of Lois Weedon, has planted wheat in alternate strips of land. The other strip is cultivated in root crops. By this means he is able to get a crop of wheat from the same field every year. The soil must undergo the necessary chemical change.

How to Make Good Bread.

Prof. Nash.—I have just been reading, in Muspratt's Chemistry, that a gain of twenty-five per cent. may be made in the manufacture of bread by pursuing the following course: A quantity of wheat bran is put in water and soaked over night, when the water becomes somewhat gelatinous, and has a milky appearance. This water is used to wet flour to make up a batch of dough. If the weather is cool the bran may be kept in soak, and even after the first water is used, more may be added for the next baking.

Adjourned. JOHN W. CHAMBERS, *Secretary.*

November 25, 1862.

Mr. Edward Doughty, of New Jersey, in the chair. The object of the day, "Pruning of Fruit Trees and Grape Vines," was first taken up.

Mr. Geo. H. Hite explained the manner of grafting grape vines. The cutting of the vines from which the bud is to be taken is cut about three inches in length; the shoot is split and the sap scraped out; the upper part

of the shoot, with the bud in, is cut so as to fit into the shoot of the vine into which you are going to insert the bud; it is left a short distance above where the graft is inserted, which is cut to fit the piece containing the bud; it is then bound with bass, and a small quantity of grafting wax is placed around it to make a perfect union. The reason I have the shoot larger than where I insert the bud, is to allow the sap to flow above; after the bud has grown, all the vine above the bud is removed.

Prof. Mapes asked if the shoot from the bud would ripen if grafted in June.

Mr. Hite.—I have not seen vines grafted so, growing in the open air.

The Chairman asked Mr. Hite to explain the manner of growing a grape vine from a cutting.

Mr. Hite.—After the border is properly prepared I dig a trench from four to six inches deep, at the bottom of which I plant the cutting, say three or four inches deep. I keep the trench open until winter, when I fill it up, cutting down the shoot to about five eyes. The following spring allow two shoots to grow from the vine; in the fall cut these two shoots back to five eyes each, and tie them to the horizontal wire of the trellis. In the following spring, when the buds begin to shoot, rub off the buds on the lower sides of each shoot. The shoots from the buds will bear fruit this year; in the fall they should be cut back to two eyes. If you wish to extend the vine, shoots may be left to fill the upper wires. Only one shoot should be allowed to grow from an eye. The specimen I hold in my hand shows the bad effects of leaving several shoots to grow from a bud.

Planting Pear Trees.

Prof. Mapes.—I have been very successful in planting pear trees. The holes in which I plant my trees are dug four feet deep and four feet wide, in the center of which I bore a hole with a borer used in setting telegraph poles, which allows the top root to descend. I use the top soil between the trees to fill up the hole. Barn-yard manure should never be used in planting out trees. I also mulch the trees with salt hay; between the rows I cultivate root crops. I apply a gill of soluble nitrogenized superphosphate of lime and a gill of wood ashes to each tree, spread around the soil within the circumference of the hole. I find that quantity of manure sufficient. The soil should be constantly washed, the more the better. Between the rows of trees I run a subsoil plow. Some years since I purchased some adjoining land, on which were some large apple trees that had not borne fruit for twelve years. I experimented on these trees, cutting out a large quantity of limbs, and trimming them very close, washing the bark with caustic soda, one pound of soda to a gallon of water, scraping off the rough bark, and treating them with the phosphate and ashes. The trees bore good crops for several years, until I found other crops paying me a great deal better than raising fruit, which induced me to cut them down. When I first purchased the farm I now occupy it was difficult to use a subsoil plow. I think I used the subsoiler eleven times before I could properly subsoil it. With a pair of mules I can run the subsoil plow anywhere on my farm.

The Chairman.—I observed around a number of your trees large quantities of charcoal dust. What benefit do you suppose arises from its use?

Prof. Mapes.—Without alluvium and carbon I think the earth would be sterile, as all nutriment would sink through the soil and render the surface barren. Charcoal is an excellent divider of the soil.

The Culture of Fruit in the Mountain Regions of New England, and the Middle and Southern States.

Mr. Alanson Nash said:

Fruit of various kinds, including apples, pears, peaches, quinces, cranberry, gooseberry, blackberry and strawberry, grapes and some others, have within the last few years very justly received public attention; we know of no business that can be carried on about a farm, by odd chores, to better advantage than the culture of fruits.

All along the Atlantic coast, from the Bay of St. Lawrence through the whole length of the granite and primitive formations of the White Mountains, Green Mountains, and the Alleghany Mountains, to Georgia, Alabama, Tennessee and Kentucky, the apple, pear and plum are sure to yield the choicest fruits; indeed, the apple likes a cool climate; so does the pear, the plum, and the gooseberry and cranberry. No part of the United States or the world produces a better flavored and a more healthy fruit than the formations of earth derived from the granite, mica slate, and the hornblende rocks of New England. The apple tree will grow amongst the granite and mica slate, and where the land is most rocky, there the tree flourishes best, if there is a sufficient depth of soil lying over the rocks to give the roots of the tree sufficient foundation. The winds of winter are never seen to hurt an apple tree, provided there is sufficient soil for the roots to take proper hold—indeed, all our northern fruit trees seem to be benefited by a fall of snow, lying deep over the roots of the trees; snow operates as a mulch or covering around the roots and body of the tree, the ground keeps warm, the heat and electricity ascend from the interior of the earth towards the surface, the circulation of the juices in the roots of the trees, when covered over with snow, is lively and active. Nature now lays in a bountiful supply of nutriment for the wood and fruit, to be warmed into life by the genial rays of the sun the succeeding spring and summer. The frost puts the upper part of the tree to sleep during the winter, and gives it the necessary rest.

The chemical analysis of fruits and the wood of fruit trees has opened within the last few years a large field for the study of nature, and has discovered most of the chemical combinations that produce and make up the materials of the fruit, and wood of fruit trees. By referring to our analysis and tables hereto annexed, it will be perceived that the primitive rocks, when decomposed, produce a soil which yields more of the ingredients of the different kinds of fruits than any other formation; and it has been a long time remarked by close observers, that nowhere, in this or any other country, can fruits be found yielding so rich an aroma or flavor as those grown amongst the granite rocks and the primitive formations.

Fruit grown on these soils is rich in flavor, solid and compact and hardy; keeps late, and with little care can be preserved during the winter, spring and summer months. The whole of the region we have spoken of, from the south end of the Alleghany mountains to the extreme land in the Gulf

of St. Lawrence, lies between the 33d and 49th degrees of north latitude, corresponding to the latitudes between Algiers and Paris and Vienna—indeed, Vienna lies farther north than Halifax, in Nova Scotia, and took its name from the fact that the country around was known from time immemorial as the wine region; while along the American coast the country has the advantage of the Gulf stream, which comes full and bold into the coast, shedding down abundant rains and snows and filling the ground with ammonia, and other productions of the sea air, the most healthful for both animals and trees. Indeed, there is no country in the world where the trees grow more healthy, strong, compact and fruitful than along the mountain ranges in Maine, and New England in general.

The gneiss and granite yield feldspar, silex and mica in abundance. The mica slate yields silex, iron, sulphur, manganese, lime and alumen. The primitive limestone yields lime, magnesia and silex, together with carbon in the form of carbonic acid or fixed air; while the talcose slates yield magnesia, lime, silex, alumen, sulphur and many of the carbonacious *minerals*. The soils from these rocks are generally retentive of *moisture*, which is essential to the healthy growth of all fruits. The alumen of feldspar, which is one of the most abundant ingredients of gneiss, granite and mica slate, is often composed of *potash* in quantities of from thirteen to twenty-two per cent. So, soda is found in various forms associated with feldspar, and in mica slate, oftentimes with the minerals in the other primitive rocks. Magnesia is one of the ingredients of the talcose formation. Then lime is found more or less abundant in all the primitive rocks, but, in primitive limestone, the carbonate of lime is its principal ingredient. Sulphur plays another important function in fruits, in combination with lime, magnesia, soda, potash and acids. Phosphoric acid is many times found in quantities, combined with lime, magnesia and other ingredients; while the combinations of nitrogen, oxygen, hydrogen and carbon from the atmosphere, go to make up the delicate ingredients of fruit, that give a luscious relish to them when ripened and put on our tables for use. Great are the mysteries of nature! and none are more so than the production of fruits from a few seemingly simple ingredients, most of which we have above named.

We have said that the formations of primitive rocks in New England contain all or most of the ingredients which are combined in various kinds of fruits. The primitive rocks in Maine are peculiarly so, while in Rhode Island and the Western part of Massachusetts the granite and primitive ridges along the Green Mountains are equally so.

The Green Stone range of rocks, which are evidently volcanic, beginning at Greenfield in Franklin county, and at Belchertown, in Hampshire county, Mass., and running through the whole length of Mount Holyoke and Tom range, and terminating at the East and West Rock, near New Haven, show on analysis a large share of alumina, potash, soda and lime. And it is to be remarked, that no finer or better fruit is found than that taken from the fruit trees along the sides and declivities of this Green Stone range, while in the western part of Massachusetts the limestone and talcose and mica slates and granite are found to be rich in potash, soda, magnesia, carbonates of lime, manganese, sulphates of lime and iron. The soil of New

England, found lying over the hills, rocks and valleys, is often from one foot to 250 feet deep; composed of elements of fertility, and are adapted to the production of fruits, grasses and woods of all kinds. The silica furnishes materials for a solid, compact body to the tree, while the stalks of all kinds of grain and Indian corn are strong in their growth, and seldom prostrated by storms and rains; wherever there is iron it is almost always accompanied with sulphur. The atmosphere takes hold of the sulphur, and with the rain and moisture soon forms the sulphuric acid; this combines with the iron, magnesia, soda, potash and lime, making sulphate of lime or plaster of Paris, sulphate of magnesia or epsom salts, sulphate of soda or Glauber salts, sulphate of iron or copperas, and other salts. The great mass of the soils of New England are rich in salts of many kinds, while the snows and the rains coming in from the Gulf stream fill the atmosphere with ammonia, which is brought down from the heavens, filling the ground and soil with a quickening fertility. The great trouble in New England has always been, that the soils compact themselves, inclining to a hard pan formation, but when these soils are dug and stirred up with subsoil plows, and made loose, they ever respond with heavy, luxuriant crops of grass, fruit trees, and excellent fruit of all kinds, from the strawberry to the quince and pound pippin apples.

It would be difficult to give any exact analysis of the different stratifications of the rocks in New England, as to their mineral contents; some of the granites run from 10 to 20 and to 30 per cent., and even 50 per cent. of feldspar, rich in potash, while mica slate frequently passes into talcose slate, containing a very large proportion of magnesia, also the salts of iron, rich with sulphur and sulphates. The limestone along on the western bank of Connecticut river contains from 10 to 40 per cent. of silica; some have more or less alumina with them, also mica and magnesian rock, while west along the Green Mountains, magnesia, manganese and the oxydes of iron abound in most of the rock formations found there. In mica slate, in many parts of New England, the sulphuret of iron often reaches as high as 60 to 75 per cent., forming beds out of which copperas is manufactured; then again all the micas generally possess from 2 to 16 per cent. of the sulphuret of iron, and when blasted out of the original rock it is soon found to be decomposed and come into soil.

The talcose rock, mica slate rocks, granite rocks and lime rocks, when lying adjacent to each other, often pass into each other by insensible gradations; so much so, that lime lying next to mica slate will often contain from 30 to 53 per cent. silica, and then again the limestone, when next and adjacent to talcose slate, will often abound in magnesia, and the mica slate will abound in lime; and the talcose and mica slate along the Green Mountains will be redundant many times in magnesia, sulphuret of iron and the sulphates of iron, and also carbonates of lime. One specimen of serpentine or talcose slate yielded, silica 42, alumina 7, lime 3, iron 27, magnesia 60, water 12. Another specimen yielded silex 43, alumina 3, iron 10, magnesia 30, soda 2, water 12; while almost all of the salts contain a large quantity of oxygen—indeed all the salts are oxydes of some kind, either sulphates, carbonates, nitrates, phosphates, muriates or unknown acids in composition.

TABLE showing the different Formations, with their Component Parts of Primitive Rocks in New England.

FORMATIONS.	Silica.	Alumina.	Magnesia.	Manganese.	Potash.	Soda.	Iron. Carbonate and Sulphate.	Lime. Carbonate and Phosphate.	Carbon and Carbonates.	Sulphur.	Oxyd of iron.	Sulphate of iron.	Water.	Ammonia.
Granites	70	8	2		8	2		5			6			
Gneiss	70	8	2.60		8			5			6.40			
Mica Slate: Specimen First	50	10	15	20		1	4							
Second	60	10	3	3	4	2	2½	6		2	4	3½		
Third	45	10	3	4	19	1	2	4			7	4	1	
Sciende or Hornblende	55	10	18	2			5	20		4				
Talcose Slate	44	4.90	34	6	1	1	6	2.10		6				
Primitive Lime, Stone and Water Lime, in Springfield, Whately, Williamsburgh and Conway: Specimen First	20						2	78						
Second	40	2					4	54						
Third	36	4	1				1	58						
Fourth	16	9	13	1				25	34			2		
Green Stone, (Volcanic): Specimen First	55	13	1	2	7	1	10						12	
Second	39	29	4		3	13	12							
Feldspar: Specimen First	37	24	3		16	20								
Second	40	28				20		6	5					
Third	38	28				21		4	7				4	
Fourth	55	23			21	1								
Fifth	63	17	3	11		6								
Sixth	66	18		2		14								
Seventh	63	17	2	15	6									
Eighth	42	28	2	9	13	3	3							
Specimens from New England have yielded: First	40	25	4		20	5	2	2					2	
Second	49	13	11	4			18	3		7			2	
Third	35	31	6	2	2	17	5			2				
Tourmaline found in Granite Rock	39	40		6		8		7						
Another specimen of Alumina Rock gave	50	19	1	3	6	5	10	8						
Trap Rock: Specimen First	69	3	7	2	5	3	3	8						
Second	40	21	3		4	5		8			17		2	
Volcanic Trap Rock: Specimen First	1	11								35			49	4
Second		12	0.28							36			45	7
Third		12				8				37			41	
Fourth		12	4	3						38			46	

There is often found in soils that are aluminous, ammonia, which goes under the name of ammonial alum, and on analysis yielded soda and ammonia, and also the sulphate of ammonia. There is another species found, called soda alum, while other specimens are called manganese and magnesian alum; it yielded alumina, magnesia, manganese, sulphur and water. These last specimens, however, come from volcanic countries. The trap rocks of New England are volcanic.

We will subjoin here an analysis of the component parts of several kinds of fruits; but we will premise that many of the operations of nature are carried on in a secret and comparatively mysterious manner; in other words, the phosphate of lime is an ingredient universally found in nature and most of the soils, but not in very large quantities at any one particular locality.

TABLE showing the Component Parts of Fruits, Grain and Potatoes.

	Ashes in 100 parts in crop as taken from the ground.	Ashes in artificially dried plants or fruit.	Potash.	Soda.	Magnesia.	Lime.	Phosphoric acid.	Silica.	Peroxyd of iron.	Chloride of sodium.	Chloride of potassium.	Carbon consumed in burning.	Nitrogen and Tartaric acid.	Hydrogen.	Oxygen and Malic acid.	Ammonia.	Water and acids.	Sulphuric acid.
Apple	0.27	84.01	35.68	26.09	8.75	1.08	12.34	4.32	2.65	......	......	6 to 15 p c	6.6	......	......	6 to 10	25 to 70	6.09
Pear	0.41	83.55	54.69	8.52	5.22	5.22	7.92	5.69	1.96	1.10	......	10 p. et.	......	......	......	2	20 to 75 pet	14.28
Cherry	0.43	82.48	51.85	1.12	5.46	7.47	14.21	9.04	3.74	2.02	......	10	3	......	......	4	50 per et.	5.09
Green Gage	1.04	83.77	59.21	0.54	5.46	10.04	12.26	2.36	6.04	......	......	15	7	......	......	4	60	3.83
Strawberry	0.41	90.22	21.07	27.01	......	14.21	8.59	12.05	11.12	2.78	......	10	......	......	......	4	40	3.15
Orange	3.94	75.85	36.42	11.42	8.06	21.52	11.07	1.44	0.46	3.87	......	12	......	......	......	4	30 to 60	3.74
Pine-Apple	4.30	80.00	49.42	4.50	8.80	12.15	4.08	4.02	2.93	17.01	0.88	20	......	......	......	5	60	1.00
Fig	3.80	91.00	28.36	24.14	9.21	18.91	......	5.93	2.76	4.02	......	10	......	......	......	2	20	6.73
Gooseberry	0.39	93.26	38.64	9.27	5.85	12.20	15.58	2.54	8.64	1.23	......	20	4	......	......	3	40	5.89
Potato	......	90.17	80.00	53.46	10.78	5.90	5.71	0.12	0.53	2.09	......	20	......	......	......	1	50	2.77
Quince	5.00	90.00	27.00	3.01	10.00	7.69	36.00	0.75	1.19	2.57	......	....	4	......	......	8	30	3.00
Lemon	5 50	80.08	33.89	3.56	10.20	12.87	40.08	0.35	1.24	2.30	......	20	......	......	......	4	30	3.30
Cucumber	0.63	97.78	47.42	0.10	4.26	6.31	14.97	7.12	2.06	9.06	4.19	10	4	......	......	1	90	4.60
Coffee	3.19	95.00	42.11	11.07	9.01	3.48	11.24	2.95	0.55	1.67	......	20	6	......	......	8	15	1.00
Indian Corn	1.50	4.00	26.63	7.54	15.44	1.59	39.65	2.09	0.60	......	......	80	8	......	......	0.50	40	5.54
Chesnut	0.99	54.61	39.36	19.18	7.84	7.84	7.33	2.30	1.95	4.88	......	20	4	......	......	0.20	40	3.88
Onion	0.46	88.05	32.35	8.04	2.70	12.66	15.09	3.04	12.29	4.49	......	15	......	......	......	8	30	8.34
Sugar Cane	2.60	70.00	32.93	0.35	16.24	10.10	6.14	41.17	5.00	13.76	10.07	40	10	......	......	4	60	8.30
Wheat	1.61	2.80	29.97	3.90	12.30	3.40	46.00	3.35	0.79	0.90	......	60	40	......	......	1	20	1.33
Oats	2.18	......	26.18	2.49	9.25	5.95	43.84	2.67	0.40	1.00	......	50	40	......	......	1	20	10.45
Flax Seed	4.63	......	25.85	6.92	14.83	8.46	40.11	10.58	3.57	1.55	......	30	20	......	......	3	15	2.47
Grapes	......	......	10	10	6	3	8	4	1	......	......	15 to 22	3	......	5	2	60	1

Taking into account the bones of all animals, from the minutest insect up to and including man, the largest per cent. by far is the phosphate of lime, derived from what each animal eats. Then, again, the salts of ammonia are a compound of gases; and when combined into a chemical form by the aid of electricity, on analysis ammonia is found to be mostly composed of nitrogen gas, the largest constituent of the atmosphere which we breathe, and seventeen parts of hydrogen gas, the basis of water, and then oxygen, another constituent part of water and the atmosphere. The buds and flowers of trees and vegetation are rich in phosphorus and ammonia. The horns of animals are composed largely of ammonia; the horns of the deer family produce an abundance of the substance called hartshorn. So the ammonia and all the salts are strongly acted upon by carbon and oxygen. Carbon in its pure state is almost the diamond; while charcoal is a compound of potash, lime, magnesia, and oftentimes seventy-five per cent. of carbon. Yet when this substance called carbon is united by electricity with oxygen, it forms carbonic acid gas, which combines with lime, forming carbonate of lime, a pure limestone—which gas we drink at the fountains of Saratoga; it comes off when new cider works or sours—showing that fruit is composed largely of carbon; hence carbonate of lime in soil is essential to the growth of fruit. Carbonic acid unites with magnesia in the form of sixty-two parts magnesia and thirty-eight parts carbonic acid; so it unites with soda in the form of carbonic acid thirty-eight, soda thirty-seven, water twenty-two; so it unites with potash, but rarely, however; so it unites with iron and various other minerals. Then, again, niter is derived from the nitrogen of the atmosphere we breathe, and forms saltpeter when combined with oxygen. It is found in the form of seventy-nine parts nitrogen, twenty-one parts oxygen; and yet with a base of nitric acid, and united by electrical action, it is found in the form of a white salt, and unites with potash in the form of forty-seven potash, and nitric acid fifty-four; while some of the earths are found to contain potash forty-three, sulphate of lime twenty-five, carbonate of lime thirty; then niter unites with soda, forming a compound of nitric acid sixty-three, and soda sixty seven. Common sea salt is formed from an acid called chlorine and common soda, and is combined in the form of chlorine sixty, soda forty. While sulphur plays an important part in all the salts, the oxygen of the atmosphere takes hold of it and makes sulphuric acid; it unites with lime, forming plaster of Paris, making a large per cent. of the horns and hair of animals; it unites with soda in the form of twenty-five parts sulphuric acid, twenty parts soda, and fifty-five parts water; it is now called sulphate of soda or Glauber salts; it is found compounded with lime in the form of sulphate of soda fifty-one, and sulphate of lime forty-nine—while one specimen gave sulphuric acid sixty-seven, soda twenty-two, lime twenty-one. The sulphate of magnesia is found abundant in nature and soils, and is called epsom salts; it generally unites in the form of magnesia sixteen, sulphuric acid thirty-three, water fifty-one. The ammonia, iron and manganese are generally the three principal ingredients that give out the color and aroma of fruit; iron gives the color of the apple; the grape and currant are colored by the iron and manganese. While carbon enters into the composition of various coloring matters, oxygen plays an important part; while nitrogen and oxygen give

us the green apple and the green gage, carbon, manganese, and the compounds of hydrogen give us the blackberry; while the strawberry is colored by an oxyd of iron—oftentimes a carbonate—and by tannic acid; indeed, the diversities and delicacies of shades of nature are combined with a Master's hand, no less than that of the Almighty Creator. Now, all other things being equal, soils and rocks that produce the largest amount of materials and constituents that, when combined, make up the materials of fruit, will produce the best fruit, and in its greatest perfection. If there is no potash or carbon found in a soil, we will find no trees; and if we cannot find nitrogen, carbon, oxygen, hydrogen, potash, soda, magnesia, manganese, lime, sulphur, alumina and silica in the soils, we have neither vegetation nor animal production exhibited; and where these articles with some few others are produced, such as phosphoric acid, sulphuric acid, muriatic acid, nitric acid, combined with salts and soils, nature is bounteous in all her productions. In herbs, trees, fruits and flowers, all is smiling, all is sweet. There are no soils that combine so many of the ingredients that constitute fruits as the primitive soils of New England, New York and the Alleghany mountains. No fruit is richer in taste or more luscious and healthy in its growth than those found in New England; no better aroma is found than amongst the flowers of trees grown on these soils; nor is there better taste or more delicate flavor to any fruits grown anywhere else. We find the apples of New England sent to China, Calcutta, South America and the West Indies, and esteemed when far away from home as the choicest of nature's productions. The high flavor of the New England fruits ships them to Europe to be eaten by the English, the French and the Germans; indeed, when the fruits of Europe were brought to the western continent they improved wonderfully in size, flavor and delicacy by being grown upon our primitive soils.

In applying the fire and heat to fruits, and the reduction of them to ashes, the carbon, the ammonia, the sulphur, the water, the hydrogen and nitrogen, and the composition of oils which are contained more or less in the skins and rinds of the fruit, are consumed and lost; in other words, they are burned up, and the vapor flies off, and the process of reducing the fruits to ashes destroys a very large portion of the substance of the fruit itself. Grapes, in order to make good wine, should be entirely ripe, and then, on analysis, they will produce the most sugar called grape sugar. The better kinds of grapes, when ripe, produce from eleven to twenty-two per cent. of what is called "grape sugar," while unripe grapes produce from four to ten per cent.; that is, after the grapes have become a natural size, but picked before the saccharine matter has developed itself. Unripe grapes cannot be turned into good wine without the addition of much sugar; hence it is when the season is short and cold and wet the grapes do not mature themselves so as to produce the grape sugar which is essential to the making of good wine. Our granite hills contain all the elements in the soils for making excellent wine, when the grapes are grown on the side hills pitching to the southward and eastward; and all along the trap rock formations in the United States the soil contains elements abundant for the growth of the best and most luxuriant fruits of the grape, apple, gooseberry, strawberry and other small fruits.

France, Germany and Switzerlnnd, and many parts of Austria, especially the valley of the Danube, grow immense quantities of grapes, yet they are in north latitude from 50 to 55, and even higher, which is ten degrees further north than New England.

In grapes there is tartrate of potash, a small quantity of nitrogen, and a small quantity of tannin; this is principally confined to the skin and seeds of the grape. The grape juice when it comes from the grape contains ninety-six per cent. of fluid, which when evaporated down leaves twenty-four per cent. of extractive matter, including all the non-volatile parts. Grape sugar is composed of six parts of oxygen, six of carbon, and six of hydrogen. The tartrate of potash seldom exceeds two per cent. The tartar appears in what is called the bitartrate of potash. More or less sulphate of potash is found in grape juice, also sulphate of soda, also the muriate of lime, also the sulphate of lime, also the phosphate of lime, also the nitrate of lime, also the tartrate of lime, also common salt, also the tartrate of alumin, but they are in small quantities; but these salts are not necessary to produce good wine, and if they are present in large quantities they have an injurious effect on the taste of the wine. Grapes grown on soil containing much nitrate of potash, nitrate of lime, magnesian earth and ammonial salts, are said to be injurious to the taste of wine; and, in order to remedy the bad taste of the wine, the amount of sugar in such grapes ought to be increased to 28 or 30 per cent. The red wines abound in tannin, which gives them a constrictive taste, while the cream of tartar is found in the white wines and gives them a laxative quality. The sweetest grapes produce from 20 to 28 per cent. of sugar; these grapes can only be grown in a warm climate and in favorable seasons. The acids of the grapes, when ripe, which give them mostly a flavor, are in small quantities—scarcely seven parts in one thousand. The best wines are made in northern climates; and the best fruits for flavor, all over the world, are found above the 35th degree of latitude, grown in hilly countries, where good air and good water are found, and on the primitive formations of rocks. The goodness of all fruits depends much on their being well ripened: 100 lbs. of good ripe grapes yield on an average from 65 to 75 per cent. of wine, of which 18 to 24 per cent. is grape sugar. The best grape-growing country in Hungary is between 46 and 52 degrees north latitude; this is farther north than Quebec on our continent. The grapes used in Hungary for wine usually ripen at the end of September, but are not picked until after the first snow falls, which is in November. The berries remain on the vines until they shrink up to raisins; these dried berries make the best wine—indeed, the great secret of making wine is to get the grapes as ripe as possible; and the secret of all good fruit is that it is healthy, grown in a healthy climate, where there is good water, a primitive soil, and where the fruit is retained on the tree until it becomes thoroughly ripe; and if it ripens late in the season—any time after the autumnal equinox—so much the better, and the longer it will keep.

THE METHOD OF PREPARING GROUND FOR REARING ORCHARDS AND FRUIT TREES.

When a person undertakes to set out fruit trees of any kind, or grape vines, or to plant fruits to grow for trees, the first thing to be done is to

take off the surface soil of the ground, from five to eight inches deep, and pile it up for a compost. The ground should then be dug over, from three and a half to five feet deep, with pickaxe and crowbar, and pulverized, and the small stone, if granite, mica slate, limestone, hornblende or talc, may be left in the soil; they do no harm, and they are more or less decomposing every year, and furnishing potash, lime, alumen, soda and manganese for the growth of the trees; but the better course would be to collect them all and build a fire in a pit and pitch in the stones, heat them red hot, then throw them into a vat of cold water; they will then all dissolve into a clay and earthy substance, which will form an excellent manure or soil to be spread and mixed with the earth dug up. If the land is springy or wet, a deep drain should be dug on the upper side of the fruit field, so as to cut off the water from the springs and prevent it running and freezing among the roots of the fruit trees. Grape vines, when grown in the field on stakes or posts, may be set out at the rate of four feet apart each way; this will give 2,722 plants to the acre. When grown on trellis, they should be set out at the rate of six feet by eight feet; this will give 907 vines to the acre. The rows had better run up and down the descent of the land.

Apple trees should be set out as wide apart as forty to fifty feet each way. Plum trees may be set out sixteen feet apart; quince bushes, ten feet apart; peach trees, sixteen to twenty feet apart; gooseberry trees, six to ten feet apart. Strawberries should be set out in drills or hills, so wide apart that they may be easily cultivated with a hoe, but not so thick that the vines and creepers shall interfere with each other. Along with the earth, and mostly in the bottom of the soil dug up, should be mixed composts of bone dust, charcoal, swamp muck, leaves of trees, barn-yard manure, rotten wood, chip dung, urine, straw, leached ashes, plaster, lime, common salt, tan bark, rotten hair, skins, dressing of leather; indeed, straw and each and everything that goes to make up the ingredients from which the fruit trees and the fruit itself are composed. The sulphate of iron is an ingredient that will be found very valuable in its applications to the growth of fruit. This is the common copperas of the market. Sawdust, from the saw mills, is an excellent article to mix with the soil. So is the plastering of old houses, when torn down. So are soot, clay, soapsuds from the laundry, the fluids from the hogpen, and the soils from underneath stables where cattle are fed and sheltered—indeed, whatever makes a rich soil for the growth of trees and fruit, is the right composition to put into the ground for fruit culture. Trees cannot grow, or large crops of fruit be gathered in an orchard of any kind, without the trees are fed, any more than fat beef and tallow can be found in an ox without he is fed to produce them. The old idea of finding the barren fig tree in the vineyard, and then digging about it and dunging it to make it grow fruit, applies exactly to modern as well as ancient times. When the young trees are ready to to be set out, a trench not less than four feet wide and three and a half feet deep should be opened through the fruit grounds, where the rows for the trees are intended to be set; into these trenches should be placed the compost and soil taken from the surface of the ground, together with the composts from the barn-yard. And, if the weather is rainy, this soil does not need to be moistened; if it is not, it should be made moist by sprinkling water

among it. The young trees should be set in these trenches, with their roots placed under ground from three to eight inches deep, trod down or pounded down so as to make the ground around them firm and solid. A portion of the top of each bush or tree should be cut off at the extreme end of the branches, so as to leave the top light, and not top-heavy, when the winds and storms assail it. This treatment is correct for apple trees, peach trees, plum trees, cherry trees and quince bushes and gooseberries. If the tree is inclined to run up fast and to make much wood, the bush ought to be cut back, as it is called, by cutting off the top sprouts, in the fall, from three inches to one foot, training the tree as much as possible into the form of a horizontal growth of the limbs; but the large limbs and branches springing around the body of the tree never ought to be cut off unless they show symptoms of decay, and then they ought to be cut down so short as to find live and solid wood, which should be immediately covered over with a grafting wax made of rosin, tallow and beeswax, which ought to be applied twice a year till the stump, the bark and new growth have healed and covered it over. After the trees are once set out, no crop, either of grass or grain, ought to be grown on the ground where the trees stand—they should be kept free of weeds. Electricity has almost everything to do with the growth of trees; grass conducts up electricity from the earth, so do crops of all kinds, and thus deprive the trees of their necessary share of electricity rising out of the earth. Trees in the neighborhood of a laundry should ever be supplied with soapsuds, carried or conveyed to the roots of the trees. Animal urine of all kinds is one of the most valuable manures for trees; indeed, so is rotten chips or the matter which accumulates around the wood yard. I have seen a tree planted near to where a hogpen was located; the roots of the tree reached the fluids from the hogpen; and although the tree has been set out over 110 years, it is hardy, healthy and vigorous, producing a full growth of apples, juicy and healthy in the extreme, seldom if ever assailed by worms or vermin of any kind. So I have seen a Gilliflower apple tree growing near a stable, where the manure is shoveled out every winter near its roots; the fruit improves vastly in quality, size and flavor.

In the winter season, young trees of all kinds need mulching, or the roots and around the body of the tree should be covered up at the surface of the ground with straw, dry leaves, chip dung, swinglingtow or any substance that would protect it from the severe action of the frost. Grape vines had better be trimmed so that the main stem, if grown in the open air, can be laid down on the ground, protected by bands of straw wound around them and a board covering the whole, to keep out the snow and ice.

Mr. George Smith, of the town of Windsor, Nova Scotia, about sixty miles from St. Johns, has followed the practice for some years, of grafting the apple and the plum upon the stock of the rock maple. We learn that he had as many as five or six different kinds of plums growing upon one maple. He has also been in the habit of grafting the apple upon the rock maple, and thus produces some of the finest fruit in the world. We obtain information from a gentleman who has been at Mr. Smith's house, and partaken of his fruit, and he assures us that his plums and apples, growing

from grafts upon the maple stock, are the largest and most delicious flavored of any that he has seen in any part of America.

The grafting is done in the fall, some time early in September, and produces fruit of an excellent quality the third year from the graft, the trees blossoming in two years. When he has made his graft he binds it up with oiled canvas and materials, so as to keep out the cold, rain, ice and snow from the scion as it is set. The maple is first cut off square near the ground, seldom higher than six feet. The sapling is not thoroughly trimmed down for two or three years, but he keeps reducing the top of the maple as the grafts grow, to absorb the sap; finally, when the grafts are become bushy sufficiently, the whole of the maple limbs and branches are taken off, leaving the limbs occupied with the grafts. Grafting on maples can be done only upon saplings. The young maple affords a stock which can be used to advantage for grafting. Sometimes the grafts have been set on shoulders or branches, where the stock of the tree is from two to six inches in diameter. Mr. Smith's orchards and nurseries are set on a level plain; the soil, apparently, is inclined to hard pan and clay; the bluffs, however, in that region of country, contain large quarries of gypsum or sulphate of lime, from which vast quantities are taken out and exported.

Mr. Smith exports his fruit for the St. Johns and Boston markets, and other seaports along the Atlantic coast, through Maine and New Hampshire and the British provinces. He grows one particular kind of plum called the "Egg plum," which grows to a large size, and is of a most delicious flavor when set on the maple. His fruit chiefly consists of the apple and the plum. Mr. Smith is one of the oldest residents in Windsor, and has carried on the fruit business for many years.

Adjourned. JOHN W. CHAMBERS, *Secretary*

December 2, 1862

Mr. Edward Doughty, of New Jersey, in the chair.

New Seedling Potatoes.

Mr. D. A. Bulkeley, of Stone Hill farm, Williamstown, Mass., presented to the Club three new varieties of seedling potatoes, to compete for the premium for seedling potatoes, and furnishes the following description:

"The *Bulkeley seedling* is the best potato for boiling that has ever come into use. They were on the public table at the late commencement at Williamstown in August last, and were complimented and called for in preference to new ones. They like manure, but will do well on poor land; grow very large vines and very few small potatoes; many of the hills without any small ones, with ten to fourteen fit for the table, and weighing from ten pounds to twelve pounds to the hill, and all in a cluster. I have taken the first premium at our agricultural society for the last two years.

"The other two varieties are new, and have never been distributed until last spring.

"The Prince of Wales is a long, white potato, ripens very early, and is a noble potato for baking. The Monitor has a pink eye, and is the king of all potatoes for baking or boiling; ripens between the Bulkeley seedling and the Prince of Wales; it is a very good keeper, and not apt to sprout; spreads a little more in the hills.

"I am very careful to have a nursery of new seedlings every year. If every farmer would do the same, new and choice varieties would be constantly developed, and this noble esculent become increasingly the pride of every table."

Mr. W. S. Carpenter.—The Bulkeley seedling I have grown for the last two years, and like them very much. I procured a new variety from Mr. Goodrich, called Garnett's Chili, which is very much of the same character. The Cusco White is another excellent new variety, produced by Mr. Goodrich, and so is his Pinkeye rustycoat. Mr. Goodrich has grown and proved five hundred seedlings, and the above three are about all that are valuable among the whole list.

Mr. R. G. Pardee.—We are constantly hearing about new seedling potatoes, and people are continually tempted to pay high prices for seeds to try the new experiment, and the success has been so poor, as a general thing, that many consider it a great mistake to try to multiply sorts, thinking that we had better try to improve the cultivation of some of our good old standard varieties. All the stories that we hear about new seedlings are not trustworthy, and many who have been to the expense of getting new sorts, find upon trial that they had the same before; the only difference being in the change of soil or mode of culture. Some twenty years ago a man brought into Wayne county, N. Y., from down east somewhere, an excellent sort of potatoes. A few years ago some of that sort were brought to this vicinity, and not long afterwards the public were offered a new potato called "Pell's seedling," which is very much like, if not identical with that grown so many years in Wayne county, which no one supposed to be a new variety. There are too many seedlings offered to the public before they have been properly tested and proved to possess some valuale property, not attainable in other sorts already in use. I don't object to improvements, but I do object to recommending or selling potatoes under new names as new sorts, and superior to all others, before their standard of value is fully established, and by some one beside the interested producer. A mere change of form or color in a potato is not an improvement.

Mr. Carpenter thought Mr. Pardee rather severe on seedlings, as that is the only way to get improved sorts, and that some of the new ones are superior in every respect. Even the famous Peachblow fails, and who thinks now of planting the Mercer? I think we should recommend and encourage the raising of new varieties. I think if the gentleman had seen my crop of new potatoes that I raised this year, he would never plant the old kinds.

Mr. Pardee.—I think Mr. Carpenter misunderstood my remarks. I am in favor of adopting new varieties which have been thoroughly tested. Take, for instance, the great variety of roses grown, the difference in some of them is so slight that it is not discernible to the common observer. The same remarks apply to the strawberry. Look at the long list advertised

by nurserymen, a great many of them worthless, and many of them having such a slight difference in appearance and taste that when shown separately the names are confounded.

Messrs. Mapes, Carpenter and Chambers were appointed the committee to report upon these potatoes.

How to make the Meetings of the Club more Interesting.

Mr. C. W. Carpenter, of Mount Gilead, Ohio, writes:

"I read the discussions and suggestions of the Farmers' Club with much interest and profit, and would suggest that if the farmers in different sections of the country would write and give their views, experiences and suggestions, the same as if they were present, would it not give a renewed interest? Accordingly I write to you what I know of the sugar cane. The season has been very propitious for ripening the seed; it nearly all got ripe, and there is enough seed saved for two or three years to come. I have seen no syrup that is inferior to the best refined golden syrup; and next year I think there will be twice the area planted that there was this. I have learned that by pulling out the heads as soon as they make their appearance, the stalk will ripen sooner by two or three weeks, and will yield more juice of a much better quality. A simple pan, without any apartments or patent fixings, set upon an arch, with handles to lift it off when you have boiled the syrup sufficiently, is the best of all arrangements. You fill it up with raw juice, then boil it down to syrup without mixing any raw juice with that partly boiled. The syrup has none of that raw taste so universal with that made on patent evaporators. If it is well skimmed it is equal to the best maple molasses."

Mr. R. G. Pardee.—The suggestion how to make our meetings more interesting, is just what we want. Let us act upon it, and invite such communication.

In accordance with this, the following resolution was adopted:

"*Resolved*, That the members of the Farmers' Club of the American Institute cordially respond to the suggestion of Mr. Carpenter, and that we earnestly request farmers, horticulturists and others to write out and send us the results of their careful observations and experiences on the various subjects of practical interest to us all."

To Prevent Mice and Rabbits Eating Fruit Trees in Winter.

Mr. Josiah Thompson, of Clinton, Allegany county, Pa., says, a small quantity of slaked lime placed around fruit trees will effectually keep off mice in winter.

"Take three or four quarts of the lime, and apply it on the surface of the ground, so as to touch the bole of the tree all around, and let it extend out five or six inches from the tree. If there is any grass about the tree, it should first be removed. The mice will not work on the surface near where the lime is applied, and as it becomes wet by rain or snow it will soak down about the roots, and prevent the mice from working underground. Thus, while the lime will prevent their working, both on the surface and underneath, it will also be very beneficial in promoting the growth

of the tree. No one need be afraid of the lime injuring the trees; there is no danger of this. November is a good time to make the application."

Another friend of fruit, in Indiana, says he preserves his trees from depredations of both mice and rabbits by whitewashing the boles close to the ground, allowing a little to run down below the surface.

The Cause of Decay of Pear Trees.

Mr. Christopher Pike, of Dunkirk, Dane county, Wis., sends the following communication upon this subject:

"There are pear trees now growing in the New England States which I knew forty years ago as bearing trees then, of a foot in diameter, but at the present time greatly increased in size, yet in good bearing condition, and apparently as thrifty as ever. On the contrary, I have known pear trees to arrive at bearing condition in a few years—bear abundantly five to ten years, and die at fifteen or twenty years of age. Now, in my opinion, there are two main causes of the early deaths of standard pear trees, saying nothing of insects. The first growers of the pear and apple in this country planted or set the tree, and then waited patiently for it to arrive at its normal bearing age, unaided by forcing process. Consequently, the tree grew slowly, the wood was very compact and fine-grained, and no more likely to be affected by age than most forest trees; in fact, so hard it was, that when the manufacture of perry was abandoned, those trees which bore useless fruit for the table were cut down for the cabinet-maker and button manufacturer; leaving others still standing in majestic vigor, yet bearing abundantly, and likely to bear for years to come. Those who force their trees by artificial means, have the pleasure of seeing a precocious growth and bearing condition, and early and quick decay, and death, after a few extraordinary crops had been taken from them. The wood of such trees is extremely light, porous, and coarse-grained—the grains sometimes exceeding a half an inch in thickness—and the wood seemingly as light as corn-stalk when dry; consequently, such wood cannot withstand the cold of winter, insects or other casualty, as those of natural growth. I have no doubt but the same reasons are the cause of the deterioration of varieties, some having become nearly obsolete, which were once deemed excellent and most worthy of cultivation; thus showing to the careful observer that precocity in fruit trees, as in everything else, tends to early decay and death. The other main cause of the short life of forced bearing trees, is the great quantity of saccharine matter such precocious trees are compelled to furnish, in order to perfect the large and constant crop which they usually produce. In transplanting pear trees, I should be careful not to break or injure the main, or tap root, and make the hole deep enough to take it in straight downwards. The main stock upwards should be allowed to grow, for the natural form of the pear tree top is conical, or at least ovate. Pruning should of course be done, but not so as to change what would be the natural form of the tree top."

Mr. John G. Bergen.—The cause of decay stated in this letter may be applicable to Wisconsin; it is not to Long Island, for there the trees do not fail from high culture or overbearing.

Prof. Mapes.—If pear trees are fed with highly nitrogenous manure, the

wood is apt to grow light, and as the Western soil is naturally in the same condition, that must be the cause.

The Chairman.—Unless the pear trees are very highly manured, the trees grow slowly and the wood is hard, not porous.

Chinese Agriculture.

Dr. McGowan, who has been many years a resident of China, gave the Club many interesting items about that country, and about the advantages that might be derived from a more intimate knowledge of its interior, as well as other portions of India which are almost entirely unknown to the "outside barbarians," as all the rest of the world are called by the Chinese. Dr. McGowan thinks that there are many things cultivated in China that would be useful here, and as their soil and climate are so various, it would be easy to adapt things from there to some portion of our country, which is almost equally various. He does not think, however, that the culture of tea will ever be successful in this country, owing to the great amount of manual labor necessary. The bamboo, he thinks, might be grown here and made useful. In China it is almost a necessity of life. All the paper is made of bamboo; the rags are needed to make soles for the people's shoes. At the present time, if we had the same stock of paper materials that China has, we should hear nothing of high prices. Among other useful plants, there are some eighty varieties of rice, some one of which is adapted to each locality.

There are many plants grown for dyeing, some of which might be worthy of our attention. Some of the animals are also valuable, notwithstanding the disfavor that Chinese fowls and sheep have fallen into.

The cotton of India deserves more attention than it has yet received, because it is grown from lat. 30° up to as rigorous a climate as St. Petersburg. Some of those varieties certainly can be grown in our Northern States as well as Chinese sugar-cane. The celebrated rice-paper is made of the pith of a plant that would grow in this latitude. It is very light, and applicable to a great many useful purposes, one of which is artificial flowers. There is the paper mulberry tree of Japan—it could be grown here. What we want is some system about collecting and sending home all the things most likely to become valuable to the agriculture and the arts of this country.

Prof. Mapes.—It is a question whether we should derive much benefit from the methods of agriculture pursued by the Chinese, but there are many things in the arts known to that singular people which the rest of the world does not know. For instance, the knot that fastens the bamboo strips around the tea chests, simple as it appears, has long defied the skill of our expert sailors. No one that I have ever heard of has been able to produce an imitation of that knot, while the string is tight round the chest. The whole business of putting up tea is a mystery which no one here will attempt to imitate. Look at the soldering of the lead inside the chest; it is beyond the art of any tinsmith in this country; and the paper in which the tea is first placed; it is totally unlike ours, that it extracts no flavor from the finest tea; and the box, so light and yet so strong that it carries its contents safely to all parts of the world. The art of paper making in

China, without the use of rags or cotton, would just now be valuable to us. The art of riveting glass, so common in China, is unknown to all the rest of the world; and until very lately so was the art of mending cast iron by uniting new metal to the old. Look at the cast iron mirrors, made very cheaply, and apparently without any finishing, being cast upon some finished surface. Their work in metal is wonderful. How do they harden copper for hammers, and brass to make cold chisels that cut iron like steel? Simple as the Chinese blacksmith's bellows appear to us, it is the famous Watt & Bolton's double acting cylinder pump. The truss bridge, for which so many patents have been granted in this country, is an old affair in China; and so is the silk loom, which surpasses the wonderful invention of Jacquard. On a Mandarin's coat can be wove the whole history of his life. So common a thing as Indian ink, we have never been able to imitate. So with vermilion; no French or English chemist can make it equal to theirs; and Chinese telescope glasses are so superior in excellence and cheapness that we import them. But perhaps the most wonderful of all their mechanic arts is their varnish, which never cracks, and is so hard that papier mache is used for almost all domestic utensils, and for furniture. Who has been able to make a chair of wood that weighs but fourteen ounces, like the Chinese bamboo chairs, of equal strength? Nor has any part of the civilized world been able to imitate many of the arts practiced in that country.

"Beautifying our Country Homes" was made the subject for the next meeting.

Adjourned. JOHN W. CHAMBERS, *Secretary.*

December 9, 1862.

Mr. Adrian Bergen, of Long Island, in the chair.

Columbia Virgalieu Pear.

Mr. Booth presented some beautiful specimens of this pear, grown upon the Fox farm, near Morrisania. They were tested by the members, and unanimously commended for quality. The size was very large, perfectly grown and ripened.

Mr. W. S. Carpenter.—The great objection to this pear is the tendency to fall from the tree. In some instances those who grow them tie them on, or hold them up by net bags, and it is stated that Mr. Booth fastened sheets to catch the pears that fell, to prevent injury by their great weight in dropping to the ground; but for this objection these pears would be preferable to the Vicar of Winkfield. This pear originated in Westchester county.

Rev. Mr. Weaver.—I grow this pear, and find it very liable to drop from the tree.

Prof. Mapes.—The winter Nelis I consider about the best of our winter pears. The principal objection to it is its tough skin.

Greenwich Apple.

Mr. Wm. S. Carpenter presented specimens of this apple. Its color red, similar in appearance to the Baldwin. Its flavor is good, and keeps well. It is only known in the vicinity of Greenwich, Connecticut, where it is highly esteemed.

How to Pack Fruit to Keep.

Mr. John G. Bergen.—I think this would be an excellent subject for discussion. How to pack fruit at home or for market, including all the forms of preservation of all kinds of fruit, and I hope it may be kept before the Club until something valuable is elicited from those present or from correspondents.

Mr. Carpenter.—I have tried oats with the chaff, just as they are threshed. Fruit packed in this material keeps in perfect order.

Rev. Mr. Weaver.—I use bran, and I find that it is an excellent article to pack fruit in.

Prof. Mapes.—I tried an experiment with grapes this season. I used the wooden boxes such as we send strawberries to market in. The boxes are made very open. In these I put a bunch of grapes each, and put them into the case, so that each bunch occupies a box; the air circulates around and between the boxes, and I find Isabellas, Catawbas and other varieties of grapes have kept well.

The Secretary read an extract of a letter from Mr. John Bruce, Mariposa, California, as follows:

"Our wild mountain flowers, although very beautiful while they last, yet are extremely short lived, and I fear would not thrive by cultivation, as by June they are burned up by the heat of the sun, and do not appear again until next season, except those that grow in gulches and ravines where the moisture lasts longer.

"I look for a great crop of fruit next season from the trees I planted this spring. I had some fruit this season as an earnest of what is to come. Peaches and grapes far exceed in sweetness and flavor the same kinds at home.

"The peculiarity that still attracts my attention in the growth of fruit of all kinds here is, that although they are all imported trees, they seem to completely change their nature, the fruit growing all in clusters like grapes, and in such immense quantities that every limb has to be propped up to sustain the weight of fruit, and this is invariably the case at all gardens I have seen."

Prof. Mapes.—It is undoubtedly more owing to the character of the soil than to the climate. I have some trees that have been planted in very carefully prepared soil, and properly fertilized, which I have been told very much resemble California trees.

Mr. Wm. S. Carpenter.—I don't believe that it is all in the soil; because, prepare it as you will, the trees will not produce as they do in California. They set full of blossoms here as they do there, but do not produce such wonderful crops of fruit. There must be something in the Pacific climate to induce this fruitfulness.

The Barometer for Farmers.

Mr. Solon Robinson.—I hold in my hand one of the most interesting, instructive letters about the use of the barometer, that I have ever met with. I will read it directly; but first I wish to present to the Club this very handsome aneroid barometer, made by Edwin Kendall of Lebanon Springs, N. Y., who gives the following rules, which I will read, because the whole subject of the use of barometers among farmers is just now very interesting. Mr. Kendall says:

"There is no point at which the barometer must stand to indicate rain or wind.

"The judgment must be governed by the rising or falling of the barometer.

"The falling of the barometer indicates the approach of a storm, the extent of which will be proportionate to the amount and rapidity of the fall.

"Showers. The barometer falls previously from four to twelve hundredths of an inch, varying in time from one to three hours. The greater and more rapid the fall, the more violent will be the shower, accompanied more or less with wind.

"Northeasterly storms. The barometer falls previously from four to eight-tenths of an inch, varying in time from one to four hours, and continues falling until the storm arrives at its crisis, when the barometer begins to rise, and continues rising until that part of the storm which comes from the N. W. passes off.

"Southerly storms. The barometer falls previously from one to four-tenths of an inch, varying in time from six to twelve hours. These storms generally precede unsettled weather; at such times the barometer continues low, and very slight additional depressions are followed by rain.

"A southerly storm is perhaps the most difficult to judge of by appearances, as appearances change so frequently without any real change in the atmosphere. During this class of storms, the utmost confidence should be placed in the barometer. After the first indication as above, and the barometer does not rise, but remains stationary, it is strong indication that the storm has not all passed."

These are the rules of one who has devoted much attention to the manufacture of the instruments, and, as you see by this, he makes very good ones. Now I will read the letter of a farmer, and you may judge how far barometers may be useful to farmers, from his experience. It comes from D. Petit, of Salem, N. J., and is dated "11 mo. 25th, 1862." He says:

"*To the American Farmers' Club, New York:*

"While reading the proceedings of your last meeting, that part relating to barometers forcibly arrested my attention on account of the views advanced.

"The question is asked, 'Can we recommend these instruments to farmers as valuable weather indicators?' and the answer is given by one of your body, 'According to my experience I should say no; that to any but well educated men, who have leisure to study and compare, a barometer is of no practical advantage.'

"I am a farmer, and who has more opportunity and need of a barometer to study and compare than a farmer as a weather indicator? It is now over twenty-six years since I began to use one, and I have watched the changes of the weather following the changes of the barometer as carefully as the well educated men, and, with all due deference to their opinions, some of which you have had before you, and including Comstock in his rules in his Natural Philosophy for the use of Schools, I must say my experience in regard to the changes of the barometer as an indicator of the weather runs counter to the rules of all of them. And yet, I do believe that barometers, with correct general rules—rules founded on correct principles—may be and are of great use to farmers.

"Comstock, in his rules for schools, says:

"'Rule 1. In calm weather, when the wind, clouds or sun indicates approaching rain, the barometer is low.'

"Reply. The average height of the barometer is about 30 inches. Two years ago, the fore part of this month, the barometer stood at 30.30 inches for several days, with a gentle wind from the southeast, air warm and very humid, with light showers. The wind shifted early on seventh day morning to the northeast, the barometer began and continued to fall through the day, and we had, from nine o'clock until night, one of the greatest rain storms ever known here. I have known snow storms, barometer 30.50, and it was quite rainy 17th inst., barometer 30.72 inches.

"'Rule 4. During the coldest, clear days, when a gentle wind from the north or west prevails, the mercury stands the highest.'

"Reply. On the 16th inst., the barometer rose the highest it has been for more than eight years—wind northeast, and not freezing cold. It clouded over and threatened rain while the barometer was reaching that height.

"'Rule 5. After great storms, when the mercury has been lowest, it rises most rapidly.'

"Reply. I have known it to stand at 29.50 for a whole day after a storm, wind hard from northwest.

"'Rule 8. When it rains, with the mercury high, we may be sure it will soon be fair.'

"Reply. My reply to the first rule will apply with equal force to this, and beside that, it clouded over and threatened rain: 16th inst., barometer 30.82, rain; 17th, 30.72, rainy; 18th, 30.30, rainy; 19th, 29.75, rainy; 20th, barometer 29.75—making five rainy days after a very high state of the barometer, and four after it began to rain. I have observed many times that the fall of the barometer alone does not indicate rain; neither does a rise always denote fair weather—but often exactly the reverse.

"The laws which govern the changes in the weight of the atmosphere are similar in some respects to those which govern the tides. Much is caused by reaction. When we see a low tide we know to a reasonable certainty that the tide must rise to fill the apparent vacuum between that and a medium tide. So with the barometer: when it falls low, or very low, we know to a reasonable certainty that a northwest wind must follow soon, because the rise in the barometer is generally caused by a northwest wind. The velocity of the wind, after the change, is generally in proportion to the lowness of the barometer and its time of duration from that quarter is

generally in proportion to the rapidity of the rise in the barometer. If the rise be sudden the wind will not continue long; neither will it be cold. If it should rise very slowly, or fall some after the wind changes, as it sometimes does, it will be of long continuance.

"From the above remarks it will appear that an extreme light atmosphere is an indication of fair and colder weather, for it denotes northwardly winds. On the other hand, a very heavy atmosphere denotes warmer and dull weather, because southwardly winds follow. I have known the barometer to rise very high with a northeast wind, and to fall very low sometimes, the wind blowing from the same quarter. The latter is generally stormy, and is followed by northwest winds; and the former by southwardly winds. If the air is very dry when the barometer ranges high, or begins to fall, it may continue to fall very low and remain clear. An instance of this kind happened one year ago, the latter part of last winter. I was called on by a man who had lately purchased a barometer. He said, according to the rules laid down, it should be raining, and it is now fair. It was the lowest he had ever seen it—29.50. He was not a farmer. I told him to place no reliance on the rules laid down—they were not to be depended on. We would soon have a very hard northwest wind, and so it proved. I have known many other instances when the barometer has fallen low without rain, and sometimes without clouds, and northwest winds mostly follow very dry.

"If the air becomes humid or heavily charged with moisture while the barometer is high, which is sometimes the case, it indicates a spell of wet weather, because the air is too heavy for a northwest wind to blow, and too humid for any other wind to clear it—so it remains wet until the air grows lighter. If the above views are correct, and I believe they are, rain depends more on the humidity of the atmosphere than on a fall of the barometer.

"One of your body condemned the barometer as a weather denoter, because it rained when the barometer rose. I do not consider that fact alone, without some other evidence, any proof against the usefulness of barometers. If the thermometer and barometer rise at the same time, it is a pretty sure indication of fair weather. If they both fall, it is a sure indication of foul weather; but if the thermometer falls while the barometer rises, and that brings rain, it is no evidence against a barometer, because a fall in the temperature will cause water to condense and fall, even if the barometer does rise. Beside that, a fall in the temperature of 20 deg. or 25 deg., which is not uncommon when a gust rises, will of itself cause a rise in the barometer. This may be easily proved by taking a barometer from a stove room and placing it out of doors in cold weather. When I told a barometer maker of this fact, he was incredulous, and looked on me with astonishment.

"A very light atmosphere, in very warm, sultry weather, accompanied with clouds, is a pretty sure indication or forerunner of hail-storms; and why? but because a light atmosphere denotes wind, and wind and heat cause the moisture to revolve into the upper regions, where perpetual congelation exists, if I may use the term; the water becomes frozen and falls in the form of hail. I have been witness to the effect of these tornadoes,

and have been credibly informed that trees have been twisted off at the but and carried to considerable distances without touching the ground.

"One year last summer, before harvest, my barometer stood in the early morning at 29.75, air very warm, and some cloudy. I told my folks the signs of the weather were indicative of hail-storms; that if we did not, others would feel it that day. Towards noon a destructive storm passed over parts ot Cumberland county, and another crossed parts of the State further up. Last summer we were visited by another, so near as to affect us seriously. In the vicinity of these storms the water falls in torrents. Why is it the learned have never enlightened the farmers, and others interested, as to the cause of these tornadoes—the why and wherefore?

"To test the humidity of the atmosphere, I had a strip of ash wood, half an inch wide and four feet long—the length is to show more effect; this was planed down to an even thickness of less than a quarter of an inch. Short pieces of white pine, equal in length to the width of the first piece—enough to cover its whole length—were planed down to an equal thickness with the first piece; these were glued on across the first piece, close together, covering its whole length. I attached a small block to one end of the first piece, and fastened it with a screw, edgewise, on a door exposed to the atmosphere, but not to the sun, so the lower end could vibrate with freedom. The white pine, by expanding in wet weather and contracting in dry weather across the grain of the long piece, has caused the lower end of the stick to describe part of a circle eighteen inches long. It is sensitive to the slightest change in the humidity or dryness of the atmosphere. It need not cost over fifty cents anywhere. Any cabinet maker, or even a farmer, may make one."

Mr. Robinson.—I hope all farmers who have barometers will preserve this letter, and apply to their use the experiences of that old Jersey farmer.

The subject of the day was then called up, viz:

Beautifying our Country Homes.

Mr. R. G. Pardee.—I have lately been traveling, and have seen so many naked, barren, desolate looking homes, that I am glad that the Club have adopted this question, and hope it will be continued until we shall be able to awaken a great spirit of improvement, and teach the people that no amount of money will make a costly house look cheerful and home-like, without the inexpensive surroundings of the garden, lawn, shade trees, fruit, shrubbery and flowers. About the adornment of home, the people need continual instruction and prompting to act. It is a scandal to us as a people to see how much this subject is neglected, and how unattractive this neglect makes many country and city houses. There is a great want of a starting point—something for an example of what is proper in the way of adornment.

In my opinion the first step necessary, in all improvements around the house, is a thorough system of under-draining and subsoil stirring of the earth. Then trees will grow. If carelessly stuck into holes, with but little preparation, what but a miserable result can be expected? I lately noticed up the Harlem railroad a splendid and costly house, with a few maple-stumps of trees planted in small holes in front, struggling to live under

such treatment, and this was the extent of the attempt of artificial adornment of the grounds.

Of course the trees and grass had but a stinted growth, for the land had never been prepared. Everything within the house, as well as the house itself, showed that no expense had been spared, yet all around looked desolate. What an influence such a home exercises upon children! What a contrast to such a one as that of Mr. Robinson, who, with but little expense, has made a neat, pleasant, convenient cottage, which in summer is perfectly enshrined in flowers, and surrounded with shrubbery, green grass, shade and fruit. When I first saw the place it was most unattractive and lacking in home comforts. Where it was then covered with swamp bushes and briers, it is now garden, with strawberries, cranberries, raspberries, blackberries and other fruit. Comfortable as it looks, it shows no labored style, but all of the adornments and comforts seem to have come naturally, and without extra expense.

I see around me gentlemen whose places are an ornament to the country. Many gentlemen of this city spend large sums of money to build country seats, and when the surroundings are completed by tasteful and experienced artists, they lend a charm to country life.

There is another place that is worthy of the attention of all who are about to build upon a very rough spot. It is that of Henry A. Underwood, at Yonkers. It was covered with forest trees and rocks, nearly all of which have been utilized and made ornamental. The steep hill-side has been terraced and made fruitful, and altogether it is one of the most lovely spots and delightful homes for a family of refinement. Such improvements of rough spots have an influence far beyond that upon the families who occupy them. It a great pity they were not more frequently to be seen.

Prof. Mapes.—It is but a few years ago that all of our designs were imported, and, to bring out native talent, the school of design was established in this city; and now its fruits are seen everywhere, yet we need a great deal more of art, especially in the adornment of country homes. Everywhere we see examples of the grotesque. For instance, a house without a curved line in its architecture, nor a bracket added to fill up a corner and break the harshness of abrupt angles. The house with its square doors and windows and peaked roof, presents its flat side to the road, with nothing to break the monotonous appearance of its bad form and color but a row of gaunt, ragged, Lombardy poplars. I recollect that Prof. Morse lectured in this city a few years ago upon landscape gardening, and imparted some very valuable information. One of the prominent matters to be insisted upon is that the letter S should be kept constantly before the artist's eyes. Let curved lines be the rule in everything, and straight ones only adopted as a necessity. Never plant trees for ornamental purposes in rows, and never arrange them so that a view in any direction will disclose an abrupt termination, but rather that the view shall fade away into obscurity. The science of chromatography must be carefully observed by all who undertake to beautify a homestead. You may write red, yellow, blue, in an endless circle, and then, no matter what other colors you use, you will find that the three colors on your circle must occur at every third, fifth and seventh position. So in planting, building, paint-

ing, and all adornments of your house, keep the laws of color and curve always before you. If you educate the eye to beauty, grace will pervade all around.

I see around me those who remember when all our crockery and china ware were embellished with a pagoda, the bridge and boat, a Chinaman carrying a large umbrella, but since schools of design have been established, these patterns have all passed away, and their places have been supplied with articles of great beauty.

I remember a few years ago that every iron railing in front of city houses or around parks, was all made up of straight rods and sharp angles. Paulus Heddle, a smith, but a natural-born artist, introduced curved lines, and made himself a fortune, while he added so much to the beauty of the city. What we now need is, not only to discuss this subject here, but more lectures like those of Prof. Morse, until the public taste is better educated upon this important matter.

The subject was continued.

Adjourned. JOHN. W. CHAMBERS, *Secretary.*

December 16, 1862.

Mr. Edward Doughty, of Newark, N. J., in the chair.

A New Culinary Plant.

Mr. Robinson presented a specimen of a plant known to Germans as Beifuss, and used by them for flavoring poultry, roasted meats, more especially for roast goose, duck and pork, and read a letter on the subject from Chas. F. Erhard, of Ravenswood, L. I.:

"I respectfully present to the Club a dried specimen of the *Artemisia vulgaris*, which plant seems as yet scarcely known in the United States.

"In Germany and France, and probably in other European countries, it is highly valued as an aromatic to give a flavor to roasted meats, omelets, etc., more especially to roast goose, duck and pork. In addition to its very agreeable flavor it is considered to promote digestion to a remarkable degree, and in some parts of Germany it is even thought to be a preventive and cure for consumption.

"To prepare the plant for kitchen use, the flower stems are cut just before the buds open, and the larger leaves plucked out from between the flower buds; they are then bundled and dried in the shade.

"When used with roast goose or duck, the hollow of these fowls is stuffed with these plants tied in little bundles and a portion of them is generally served out on every plate, the buds on them to be eaten off as any one may best contrive to do it.

"Finding it impossible to procure a root in New York or Philadelphia, I imported a number of them from Germany in the spring of last year (1861), which I propagated with great success, so that I have now a good supply of them."

Mr. John W. Chambers, the Secretary, announced that Mr. Edwin Ken-

dall, of New Lebanon Springs, was present, and was desirous of making a few remarks in relation to barometers.

Mr. Solon Robinson.—Mr. Kendall is the manufacturer of the fine aneroid barometer that I presented to the Club last week, and I hope he can make it apparent that barometers are generally more useful to farmers than my remarks last week would indicate.

Mr. Kendall said:

Gentlemen of the Farmers' Club of the American Institute: I am before you at my own request, to speak of the barometer, and its utility as an instrument worthy to be recommended to farmers as a weather indicator.

You are all familiar, no doubt, with the principles of the barometer, so I will merely say that the Torricellian tube is made of glass, thirty-two inches in length, hermetically sealed at one end, and forming a syphon at the other end, three or four inches in length. The tube is then filled with mercury and inverted. In the long arm of the tube the mercury rises at tide water, or sea level, to about thirty inches; in the short arm it rises two or three inches. The atmosphere, pressing upon the surface of mercury in the short arm, suspends the mercury in the long arm to about thirty inches; thus the weight of the column of thirty inches forms a counter balance against the weight of the atmosphere pressing upon the surface of the column in the short arm.

Other forms of construction have been introduced for the purposes of convenience, ornament or portability—the latter being the greatest object, as it is an exceedingly delicate instrument to handle, and one very liable to derangement. The various methods used to render it portable render it less sensitive to atmospheric changes.

The aneroid barometer is a metallic instrument, the vacuum of which is obtained by forming a box or chamber of thin elastic metal, about two and a half inches in diameter, and one-quarter of an inch thick. From the chamber the air is exhausted by means of an air pump; when thus exhausted the walls of the chamber are pressed together by the external pressure of the air. When the chamber is in its place in the instrument, the chamber walls are suspended by a lever, and held in suspense by a spiral spring placed under the long arm of the lever, thus forming a counter balance, by its own strength, against the pressure of the air upon the external surface of the chamber, and by a combination of levers and springs motion is given to a pointer or index, which passes over a graduated dial in a way to correspond with the movement of the mercury over its scale, thus making an instrument answering all the purposes of a good barometer, and one more sensitive, and free from every other objection to the mercury barometer.

Having given you a short description of the various forms of barometers, I proceed to speak of the manner of using it. Early in my experience in making barometers, I sought in all scientific works within my reach to find rules for observation, and could only find this, that in clear weather the mercury stood high, and before a storm it fell. I then from my own observation drew up the rules which I furnish with my aneroids, and which have been read to you by my friend Solon Robinson, and after mature observation I am satisfied that they embrace everything necessary to be under-

stood in order to make the barometer a useful instrument, and yet they should be explained in order to be understood by men who have not made the subject a study, as I have; and that explanation I may wish to make, reviewing my rules in every article. Rule 1. There is no point at which the barometer must stand to indicate rain or wind.

This is simply to counteract an impression in the public mind, that if the barometer stands at a given point it will rain or be clear, as the case may be. In England, where the climate is not as variable as in this country, they use on their barometers the words *fair* at 30 inches, *change and rain* 29¼ inches; now, if you mark your scale at these points with the words above indicated, at the sea level, and then remove your barometer to a locality say one thousand feet higher than the sea level, your barometer will stand *in clear weather* at the point marked *rain*, so that if for no other reason this alone is sufficient for having no marks on your barometer.

Rule 2d. The judgment must be governed by the rising or falling of the barometer.

The falling of the barometer indicates the approach of a storm, the extent of which will be proportionate to the amount and rapidity of the fall. The ordinary variation is about one inch, the extreme variation is about two inches; the extremes are seldom reached—only three or four instances that I have noticed for thirty years. My rules divide storms into three classes, but strictly speaking there are but two classes, as showers are but the reaction or the passing off of a storm, and that only in the season of showers, say June, July and August.

Northeasterly storms. In this class of storms the barometer usually falls from a high point, and when only wind blows from the N. E. the barometer seldom falls much, and sometimes even rises with a N. E. wind, but when much rain falls in a N. E. storm, the barometer falls from ¼ to ¾ of an inch; when the storm comes to a crisis, or when the wind changes to N. W., the barometer begins to rise, and more or less rain falls from the N. W. and with a rising barometer. (Rain only falls with a rising barometer when a storm is passing off.)

Southerly storms. My rules say that in a southerly storm the barometer falls from one to four-tenths of an inch, and varying in time from six to twelve hours; this variation, in time, is too limited; instead of twelve hours, it often happens that the south wind blows two, three and sometimes four days after the barometer has fallen, and during this time the barometer does not vary much from the point to which it fell at first. Rain seldom falls with a south wind; but on a change of wind to the southwest or west, from which points an abundance of rain usually falls, the action of the barometer during this class of storms is very slight after the first fall. About the time of change of the wind to southwest or west, there will or may be a slight fall of the barometer; but if there is no change in the barometer at this stage of a southerly storm, the first fall of the instrument is to be relied upon, and after it has rained freely, if the index does not rise, depend upon it there is more to come.

In the season of showers, southerly storms usually pass off in a series of showers, instead of passing off in a steady rain. There will be showers for several days in succession, each of which will be indicated by a fall

of the barometer of from one-tenth to three-tenths of an inch, and varying in time from three to six hours, and sometimes more; my rules say from one to three hours.

But the aneroid is a much more sensitive instrument than the mercury barometer, and I have known showers to occur at three o'clock and seven o'clock, P. M., that were indicated by nine and ten o'clock, A. M. It requires some care and study to understand the movements of the barometer, as there is some difference in its action in different localities during the same class of storms.

Prof. Mapes.—The important point with farmers is not to foretell the weather for days ahead. If they can have it six hours ahead it will serve their purpose. As a general thing, I fear that the science of barometrical observations is too abstruse for ordinary farmers.

Mr. Kendall.—It is not so for intelligent farmers. Men who do not read, study or think, should not have a barometer. You all, perhaps, remember the old story of the farmer who carried a stone in one end of his bag to balance the grain in the other. There are some just such men now-a-days, who, of course, are not intelligent enough to use barometers, which, if properly understood, will always foretell the approach of a storm.

Mr. Solon Robinson.—This is just the point at which I want a little tuition. I believe that I am about of an average degree of intelligence with the farmers of this country, and I must acknowledge that I am not a little puzzled to understand the barometer, so as to guard against an approaching storm. For instance, I have always been told, and hear it repeated to-day, that when there is a rapid fall we may surely look for rain. So I brought my umbrella this morning, because I saw that the barometer had fallen from 30 5-10 on Sunday to 30 Monday evening, and this morning it stood at 29 6½-10, and thick clouds and a mere sprinkle of rain about daylight. With such a rapid fall, I certainly had a right, by all the rules I ever read or heard, to look for rain before night; yet it has not fallen, and now the sun is shining. True, it is no great loss to me to carry my umbrella; but what if a farmer had neglected some important work, because the barometer told him it would rain, and he found it did not—would he be likely to depend upon it again?

Prof. Nash.—It is not claimed that the barometer is always truthful. I have faith in the indication, and believe that Mr. Robinson will yet require his umbrella before he gets home. It rained in Brooklyn this morning.

The Chairman.—It rained at Newark this morning before I left for the city.

Mr. Carpenter.—I believe barometers are useful instruments, but must not be implicitly relied upon. I have used a barometer of Mr. Kendall's make for the past year, and have observed it pretty closely. I find that a fall does not always indicate rain.

Prof. Mapes.—Will not a hygrometer, placed, for instance, under the eaves of a barn, out of the way of the rain, and within view of the house, indicate the approach of dry or wet weather. I think, with a little experience, a scale could be formed that would be of great use to the farmer.

Mr. Kendall.—The hygrometer is an instrument having for its motive

power any substance that will readily absorb or repel moisture, and I have always regarded it as an instrument that should accompany the barometer, but have never adopted it for the reason that I never have been able to fix upon any absorbing substance as a standard instead of the wet bulb. The two instruments combined would render both more valuable than either alone.

Dr. Trimble.—My barometer in summer time is the action of swallows in their pursuit of insects.

Mr. Cavenach.—The poor man's barometer is found in many plants, which certainly indicate changes in the weather. The pimpernel and the common chickweed always close their flowers on the approach of a storm.

Mr. Solon Robinson.—I would advise every one to study them carefully, and use them as adjuncts to many other things that will help them in prognosticating the weather.

Mr. Carpenter.—I have listened with much interest to Mr. Kendall's remarks, and think for the future they will be of benefit to me; and I take great pleasure in moving the thanks of the Club to Mr. Kendall for his explicit explanations.

The motion was unanimously adopted.

The subject of the day, "Beautifying our Country Homes," was then called up.

Mr. Pardee.—I hope Mr. Carpenter will open this subject, as he has had some experience that will be of interest to us all.

Mr. Carpenter.—I am always ready to say a few words on this subject. The farm I now occupy was like the rest of my neighbors'—it had a very desolate appearance; nothing to please the taste or delight the eye; the usual stone walls, and a few poplars planted before the house. I commenced by laying down a lawn and planting out a great variety of ornamental evergreens and choice flowering shrubbery. I have also erected suitable outbuildings. My taste was in favor of fruit, of which I have now a great variety, embracing nearly all the new kinds. My neighbors have all gone into the decoration of their houses and grounds. Evergreens are now generally cultivated. My first experience with flowers was planting a running rose. These improvements are very marked in Westchester county, and give an air of comfort, not only to the residents, but even to the wayfarer.

Prof. Mapes.—I spoke last week on the importance of landscape gardening, but in our improvements we generally begin at the wrong end. While straight lines of garden walks remain, and long avenues of trees are planted, the rules of beauty are infringed upon. The walks should always be in curves, and the trees planted in such a way as to improve the landscape. Color of foliage should be so arranged that we do not have the same to strike our eyes on the rising as on the setting sun. Landscape gardening should be classed as one of the fine arts. When once we become imbued with the beauty of form, we always attempt to carry it out in our various improvements. Go to the stores and examine the articles made in France, and admire their beauty; the art of design is there carried out in all their manufactures; the whole world is indebted to France for its arts. Ladies of wealth, in England, wear French lace, although they

know that the English lace is stronger and will wear longer, but it lacks that delicacy and design which its French neighbor possesses. If we wish to improve landscape gardening we must make the art of design part of our common school education. The line of beauty of Hogarth will last as long as time; he always had the letter S painted on his palette.

The subject, "Winter Care of Manure," was laid over until the next meeting.

Adjourned. JOHN W. CHAMBERS, *Secretary.*

December 23, 1862.

Mr. John G. Bergen, of Long Island, in the chair.

Mr. W. S. Carpenter presented a number of varieties of apples, viz.: Northern Spy, Rambo, Greenwich, Westfield Seek-no-further, Southworth red.

The Chairman.—I hope Mr. Carpenter will make some remarks on these apples.

Mr. Carpenter.—The Northern Spy is from a tree that has been nine years in bearing; it is useless to speak of its quality, for that is generally acknowledged to be very superior. My remarks will apply to its value for cultivation in the vicinity of the city, which has been generally doubted. I must acknowledge that I have been in this class, but I have now changed my opinion. All that is wanted is age for the tree. While young it grows very vigorously, and is of a beautiful form, but is a shy bearer, although my trees produce a good crop.

The Rambo is an apple of excellent quality and promises well; the tree is a vigorous grower.

The Greenwich is a new apple, which originated in Westchester county; the tree bears an abundant crop. I consider this apple deserves attention, on account of its disposition to produce a crop every year. It is a good sized handsome red apple, not as high flavored as many others, but will doubtless sell well in this market.

The Southworth red is a handsome, medium sized apple, mostly red, with a peculiar formation next to the stalk.

Mr. A. S. Fuller.—The description of the growth of the first named apple, given by Mr. Carpenter, is that of the Rambo, but the taste of the fruit is unlike it, though the resemblance is very strong.

Dr. Trimble.—The apple is not the Rambo, although it has some of the flavor of that apple.

Ripening Pears.

Mr. John G. Bergen presented some very fine specimens of the Vicar of Winkfield pear, which led to a discussion upon the proper manner of keeping and ripening winter pears.

Prof. Mapes.—The specimens do not appear to me to be ripened rapidly enough; this is the great secret of the art; keep them in a room just above freezing until wanted, and then bring them into a very warm room.

Mr. W. S. Carpenter.—I have to learn that the Vicar of Winkfield should

be ripened in a warm room. I formerly advocated that plan, but I have had the best success in keeping these pears in a room at 40° until ripened; at 50° they were not so good, and at 60° I think the flavor is injured.

The Chairman.—The Beurre d'Anjou promises a number of excellent qualities; it never rots at the core, but begins to ripen on the outside, while the Flemish beauty almost always begins to ripen at the core; it colors well, very yellow with a red cheek. I consider it one of the best pears for market. There is a great deal in soil and situation, in relation to pears, not yet fully understood.

Mr. A. S. Fuller.—This is true. In a conversation with a gentleman from Norwich, Conn., this morning, he informed me that the Beurre d'Anjou is the best of all winter pears, keeping well till January.

Prof. Mapes.—I find that all my Duchesse pears that I procured in France, in ripening show a much better color than fruit grown under the same treatment upon native trees; even grafts taken from the imported trees, and grown on American stocks, do not produce the same colored fruit as the original tree. It was the same when budded upon quince, as on pear stocks; this is a fact hard to account for. The Glout Morceau is an excellent pear with me, very sweet, melting when taken into the mouth, and brings a good price from judges of fruit.

Mr. A. S. Fuller.—I am surprised to hear Prof. Mapes give the Glout Morceau such a high character. I consider it has a very poor flavor, and is very watery; soil, perhaps, has something to do with the flavor. The Winter Nellis is a very superior flavored pear.

Mr. Bergen.—I grow pears for profit, without reference to size or flavor.

Mr. Carpenter.—Will Mr. Bergen give us an account of his way of ripening fruit?

Mr. Bergen.—I have no convenience for ripening or retarding fruit, except what every farmer has. I keep mine in a barn or cellar. Last year I placed some Easter Beurre near a furnace, but I did not ripen them, and I am afraid it will be so this.

Prof. Mapes.—The best rule for all amateurs to follow is the French catalogue, as to time of ripening the several sorts, letting them hang as long as proper, and then storing them in as cool a place as they have, so that it is five deg. above the freezing point, and then at the time would bring them into a warm room to ripen. You must not put anything around them to absorb the flavor; if you do, they will have no more flavor than a turnip. I was pleased with the suggestion of Mr. Carpenter—packing them in rye chaff. Perhaps about the best thing is rice hulls, which are mostly composed of silex. Do not use ground cork, plaster, charcoal, sawdust or bran.

Mr. Carpenter.—I think leaves, thoroughly dried, are excellent to pack fruit in.

Mr. Fuller.—I am pleased to find that the discussion has taken this shape. I find in all our old works that they recommended rye chaff to pack fruit in.

Mr. Carpenter.—I think that fruit ripened in a cool room contains more sugar than it would if ripened in a warm one.

Prof. Mapes said it might have a sweeter taste and yet not contain so much sugar. No one will contend that a pound of molasses contains a

pound of refined sugar; yet it is well known that the molasses used in cooking will give a greater amount of sweet taste than the sugar.

Some discussion followed in relation to pumps for farm use.

Prof. Mapes.—There are a number of pumps that can be found in agriculture warehouses. West's pump was a very good one; also Edney's. A Mr. Porter has made an improvement in the manufacture of pumps. He makes them out of a metal similar to type metal. They are cast in polished moulds, which saves the expense of finishing, and allows him to sell them at a lower price. They are very good pumps.

Mr. Carpenter inquired whether being made out of this metal would not render them liable to be bruised.

Prof. Mapes.—They are set in an iron tripod, which preserves them from injury.

The subject of the Winter Care of Manure was laid over until the next meeting.

On motion, it was resolved, that when we adjourn we adjourn to meet on Thursday, the 8th of January, at 11 o'clock A. M.

Adjourned. JOHN W. CHAMBERS, *Secretary*.

January 8, 1863.

Mr. John G. Bergen, of Long Island, in the chair.

Are Barometers Valuable Instruments for Farmers?

Mr. Van Brunt, a Long Island farmer, said that he had carefully observed the barometer for seven years, and is satisfied that it does not give any indication of rain, except thunder storms, and those only because they are accompanied by wind. It is an indication of an approaching wind storm, nothing else.

Mr. Fuller thought his barometer of much use to him. It had fallen an inch since Saturday, and yesterday we had a high wind. As thunder storms are generally accompanied with wind, he thought a farmer could tell when one was approaching, by the barometer, and so find it useful.

Mr. John G. Bergen.—I believe the farmer who depends upon the barometer to know the state of the weather, will know just as much about it as he who depends upon telling the future state of the weather by the moon. If Mr. Van Brunt fails to make the thing useful, I do not believe there are many farmers who will do any better, for I know that he is a very careful, observing man.

Inquiry about Fibrous Plants.

Mr. G. J. Locke, of Rutland county, Vermont, sent a specimen of fiber of "Indian hemp," inquiring whether it had ever been cultivated, as it has an abundant and strong fiber—almost as strong as silk, if gathered at the proper time—and grows in bunches in swampy ground, with stalks three feet high, and was, he believed, perennial.

Mr. Fuller.—This plant is indigenous to almost all parts of the

United States, and well known as a medicinal plant, the root being a sure cure for worms in children. I have never heard of its being cultivated, but think it might be. I think it belongs to the same family as the plant known as boneset, and grows in similar soil and situations.

Dr. Church.—No, the boneset is *Eupatorium*, and the Indian hemp *Apocynum cannabinum*. It is so common that the value of its fiber might be easily tested next summer.

Prof. Mapes.—This plant is found growing in all parts of our country. The fiber is coarse, and a very great percentage is lost in dressing it.

A Convenient Hog-Scalder.

Mr. G. Haines, of Medford, N. J., sends us the following description of a very convenient and economical hog-scalder, well known in Burlington and Monmouth counties, and little or none used anywhere else:

"It is made of cedar or white pine plank, two inches thick, with dimensions about as follows: Two feet four inches wide at bottom, two feet ten inches at top, two feet three inches high, six feet three inches long, and clamped well with iron to prevent leaking from being frequently wet and dry. A copper pipe about ten inches in diameter, and nearly the length of the trough, is fastened near the bottom, at one side, with one end opening out of the trough. At this opening is placed a sheet iron door, containing a smaller one for draft of air, like an ordinary stove door. On the other end of the pipe a double elbow, five inches in diameter, is placed, connecting with a return pipe of same size (five inches), which has its exit hole at the same end and near the door. A pipe such as is used for stoves conducts the smoke from the exit hole to eight or ten feet from the ground. A light rack is placed about two inches above the copper pipe, to prevent the hogs from touching it. Said rack is fastened to its place with a button, so that it may be taken out easily for the purpose of cleaning the trough. A light cover to prevent evaporation, and a small skid for rolling heavy hogs in the trough, accompany each scalder. This description may be vague, but it is as plain as I can make it with so few words.

"A lighter and less expensive trough is sometimes made, with a single copper pipe, having a door at one end, and exit hole for stove pipe at the other. It may take a little more fuel, but the difference is not appreciable. Light, dry, flashy fuel is the best; it should be cut fine and about a foot long.

"These scalders, with the appurtenances, cost from about forty to fifty dollars. I never heard of one costing more than the latter sum. We think they are as much ahead of the old way of heating water in kettles hung over a trench, or by hot stones, as that is preferable to covering the hogs with leaves and singing them. If a man has but two or three hogs to kill, I believe the custom is invariably to go and hire a scalder. Two men can load one on a wagon, and I never heard of but one price—fifty cents per day. Two moderate wheelbarrow loads of wood, I think, would be plenty for scalding thirty or forty hogs. When the water is once hot enough, very little is sufficient to keep it just at the right temperature. I am acquainted with scalders which have been in use twenty years, and are now as efficient as ever, though most of the old ones were hired enough in two years to pay for them."

Prof. Mapes.—There is a cheap boiler made by Mr. Prindle, which is preferable to the one described. Without the top it is like the farm boiler; when the upper section is placed on this boiler it forms a steam-tight boiler. It has a flexible tube which conveys the steam into hogsheads standing near, in which the articles to be scalded are placed. The steam can be conveyed 100 feet, if required, through cheap wooden pipes laid under ground.

Rev. Mr. Weaver, of Fordham.—In connection with this hog question I should like to inquire what are the peculiar qualities of the Berkshire hogs, which render them more valuable than other breeds.

Mr. Solon Robinson.—One of them is the extraordinary amount of lean meat contained in the hams. They are also docile, easily fattened, mature early, and are generally considered a profitable breed.

Mr. Carpenter thought a cross—half Berkshire, half Suffolk—preferable to either.

Mr. Adrian Bergen.—The reason why we breed Berkshires is that they make such large hams.

The Chairman.—Some people prefer large hams very lean, but I prefer a fat ham.

Discussion about Horses—Force of Men and Horses Compared.

Mr. Solon Robinson opened the discussion by reading the following extract from *The Working Farmer:*

"Desagulier's Experimental Philosophy gives much information on the subject. The horse draws with the greatest advantage when the line of direction is level with his breast; in such a situation he is able to draw 200 pounds eight hours a day, walking about two miles and a half an hour. This, of course, does not relate to the weight of the wagon, or load, but to the amount of force he exerts upon the shafts. If the same horse be made to draw 240 pounds, he can work but six hours, and cannot go so fast. On a carriage, when friction alone is to be overcome, a middling horse will draw 1,000 pounds. If a weight be suspended in a well by a rope passing over a pulley, a horse will lift, when attached to this rope, but about 200 pounds. His feet cannot hold on to the ground with a force anything equal to his own weight operating against his line of travel.

"Five men are equal in strength to one horse, and can with as much ease pull the horizontal beam of a mill occupying a circle of nineteen feet, while three men will do it in a walk forty feet wide.

"A horse employs much less force when required to draw up hill; if the hill be steep, three men will do more than the horse, each man climbing up faster with a burden of 100 lbs. weight, than a horse that is loaded with 300 lbs. This is due, of course, to the position of the parts of the body being better adapted to climbing than those of the horse. In a horizontal direction the quadruped has the advantage over the biped. Thus a man weighing 140 lbs., and drawing a body along by means of a rope coming over his shoulders, cannot draw above 27 lbs., or exert above one-seventh part of the force of a horse employed for the same purpose.

"The very best and most effectual force in a man is that of rowing, wherein he not only acts with more muscles at once for overcoming the resistance than in any other position, but, as he pulls backward, the weight of his body assists as a lever for continuous labor.

"The horse is enabled to do more work on a surface of variable figure than in a very level country. Horses do not wear well if all the roads they draw upon be on an inclined plane or a fixed gradation. Every change of figure in the surface brings into action another set of muscles, so that all the muscles of the horse are in turn called upon to act on the varied surfaces, whereas those of a continuous figure appeal to one set of muscles alone."

Prof. Mapes.—This statement of Desagulier is not intended to show what a horse may do by the exercise of weight and momentum combined, because much more is accomplished by momentum than by any other force. For instance, the stroke of a hammer upon the head of a nail exerts a greater force than many tons of dead weight. So the horse, by the force of his muscles, exerts the power of momentum, combined with his weight, and accomplishes a task far beyond what he could by weight alone. There is a book published by Mayhew, in this city, which contains some details of experiments made by the English Government with a cavalry regiment, which ought to be in the hands of every farmer. It would teach them much about the proper use of horses, and the adaptation of different weights and forms to special work. A horse for speed requires to be of very different construction from one for draft; and every horse requires a particular regulation of the line of draft, to enable him to exert the greatest power. I have seen men change a pair of tall horses for a small pair without changing the draft-rod of the plow. In such a case there is a great loss of power; so there is in the form of the plow; and it is impossible to tell by the appearance of the work of the horses, or the looks of the plow, whether it will run easier than another or not, until both are tested by the dynamometer, and the line of draft equally regulated to suit the size of the horse. In work that is accompanied by quick movement, the weight of a horse has little to do with his efficiency; but in a slow, heavy pull, horses of a heavy weight are much the most suitable. [He illustrated this point by an anecdote of exhibition of strength by a very strong man, who could pull up from the floor, or pull across the room, any man of equal weight with himself, however muscular. The Professor said to him, "Strong as you are, I can take another man as heavy as you under my arm, and with the other hand drag you where I please." This was done with perfect ease, very much to the astonishment of the exhibitor, who thought he had encountered a man much stronger than himself. On the contrary, it was the mere force of weight that enabled him to keep his feet more firmly fixed on the ground.] It is just so with heavy horses. You may observe them at a hard pull, in starting a heavy load, taking steps of scarcely an inch in length. For such work, the power of draft will not vary five per cent. in horses of equal weight, no matter what their shape. The weight has very much to do with their power in other work. For frequent stopping and quick starting, a large horse is not suitable. In some farm work we want intensity as well as dead weight. For the latter we want

a horse built so as to throw the most of his weight upon the fore legs. The joints of a horse's legs work somewhat like the short toggle-joint of a printing press, where great power is required at the last pinch. Some horses are so built as to be almost useless going up hill. One of the principles by which a horse works is illustrated by this principle: Suppose a ship rigidly held by a rod of iron. It would only require the motion of a slight wave to snap that iron like a pipe stem. If the same rod were made into a chain, its strength would be amply sufficient. In the traces of a plow harness, the more rigid the better, provided there is no danger of hitching the plow against some rigid substance. Some persons make the most of their traces of iron rods; others endeavor to hitch their horses as near the work as possible, to avoid the spring and reaction of a long chain. The nearer you get the horse to the work the more you gain by the momentum of his weight.

Mr. Solon Robinson.—As a general thing, and taking the average work on a farm, I believe the most economical sized horses are those of about fifteen hands high, and of 900 to 1,000 pounds weight. In training horses they should be hitched to loads so light that they would be sure to be able to start them, and gradually made heavier and heavier, and the horse taught to take very short steps, so as to accomplish by the momentum of a light horse what a heavy one would do by weight. There is much matter for thought by all farmers connected with this question about horses.

Mr. Adrian Bergen.—There is a great deal in having your harness fit the horse perfectly. In plowing, a slight change in the trace chain will make a great alteration in the power applied to the plow.

Adjourned JOHN W. CHAMBERS, *Secretary.*

January 13, 1863.

Prof. Mapes, of New Jersey, in the chair.

Seeds of the Black Thorn.

A northern farmer asks if the Club will, in their discussions, disclose how to make one in a hundred of the common or black thorn vegetate, and says, "you will thereby render an important service to northern farmers. I have tried a bushel of seed, and never succeeded in making one grow."

In answer to this it was said: That as soon as the seeds are gathered, they should be buried in the ground, where they are left during the winter; in the spring, when the pot is opened, they will be found to have sprouted; they should then be carefully planted in drills.

Prize Essays.

The Secretary announced that it would be necessary to appoint a committee to examine and award the medals offered by the Institute for essays upon fruit culture, and also vegetables. Messrs. John G. Bergen, Judge Van Brunt, Wm. S. Carpenter, and R. G. Pardee were appointed upon fruit; and Messrs. Mapes, Pardee and Weaver upon vegetables.

Hoeing Wheat.

Mr. A. B. Travis, Brandon, Michigan.—Mr. Chairman: I wish to introduce to your association the importance of hoeing wheat in the spring between the rows, when planted in drills, as soon as the ground is dry enough. I have been trying some experiments a few years past, which have proved very beneficial, and would solicit your attention and urge every farmer to try the experiment. As experience has taught us to cultivate corn fields, gardens and fruit trees, would not the same rule prove equally good in cultivating wheat and other like crops?

As hoeing wheat by hand would be rather slow for this country and behind the times, I arranged a cultivator, on wheels of the same width and space of a drill, with small teeth to go between the rows of wheat; and with lever handles I can guide the hoes between the rows to any crook the drill may have made. Thus one man with two horses can hoe as fast as he can drill, say eight or ten acres in a day, at any depth required. The hoe is very simple and durable, easily adjusted; by shifting the teeth it can be used for corn or fallow.

I would advise every farmer to try at least a small spot with a hoe, and watch the result. Where I tried it a difference of full thirty per cent. was gained—the heads were larger, and they often produced an extra row of kernels. On clay and heavy soils hoeing is much more needed than on light.

As winter frosts and spring thaws cause the ground to slack, which will afterwards bake by the heat of the sun, unless mellowed by some hoeing process, thus letting in light and wet, and those gases that advance vegetation. Hoeing also removes all foul weeds that come up promiscuously between the rows; it also strengthens those shoots that are injured by the winter causing them to branch out, and feeble suckers to become large and healthy heads. The cultivator also prepares the ground to receive the seeds.

I have used this cultivator two years in my own wheat field and in my neighbors'. In 1861 the benefit derived from hoeing was from 25 to 30 per cent.; this year full 30 per cent. on the same farms, and some think the wheat on the land hoed was full one-third better than on either side which was not hoed, but otherwise had an equal chance. Yet there were some small strips that I cultivated at different seasons of the year that did not appear to be benefited, owing to the season when done.

I have added an attachment to it, and by shifting the teeth I can plant or cultivate two rows of corn at one time; and if desired, I can use plaster every time I cultivate it.

I will give any information I possess, such as will enable any farmer to have one built, who desires to avail himself of this useful labor-saving machine.

Mr. Wm. S. Carpenter.—I have practiced the same plan upon Indian corn, sown for fodder, with very marked advantage over that sown broadcast.

The Chairman, Prof. Mapes.—Although the "Louis Weedon system of growing wheat" has been frequently spoken of here, and is familiar to all who read the annual reports of the Royal Agricultural Society of England, it is well to keep it alive before the American farmers of the old States, where

wheat growing has become so precarious that it has generally been given up. That system, so thoroughly tested through many years by the Rev. Mr. Smith, is this: He lays off the ground in strips, two and a half or three feet wide, and plants alternate strips, and cultivates the others just as we cultivate between rows of Indian corn. He finds that a field may be thus continued in wheat sixteen years without manure, and not deteriorate. Indeed, the yield is now much larger than it was at the commencement of the experiment. Then the yield was twenty-three bushels per acre; now it is thirty-eight bushels. The wheat roots spread into the blank spaces, and receive the advantage of the loosening and aerification of the soil. The rest thus obtained is equivalent to a rotation of crops. I have found great advantage in sowing corn land late in autumn with red-strap turnips, although they may not grow large enough to make them of any value for cattle feed. In a mild winter like this, they continue growing, and although there may not be much of a burden upon the soil to turn under, the land is certainly benefited much more than the cost of seed and sowing.

Mr. Carpenter said that farmers had generally found by experience that it will not answer to sow wheat after wheat, and it should be observed that scarcely any other crop will do as well. I planted cauliflowers last season upon the same soil that grew cauliflowers the year before, and the consequence was that the plants grew club-footed, and with poor heads. Even Indian corn is best when rotated with other crops; but one thing may be observed, that any land that will produce a good crop of cultivated grass will produce good corn.

Prof. Mapes.—It is useless for us to try to grow wheat after wheat by our system, while by that of Mr. Smith there is no difficulty; and if we can get more wheat from half the surface, why should we plant the whole, or why change from field to field? It is the practice of the fallowing system in such a way that the growing crop gets the advantage of every summer plowing of the fallow.

Mr. Solon Robinson.—The same system has long been practiced by the growers of Sea Island cotton, and to some extent in growing corn in Virginia and North Carolina.

Lecture upon Insects.

By invitation of the Club, Dr. Trimble, of Newark, will give a brief lecture upon insects, and exhibit a set of beautiful illustrations, which he has had prepared at considerable expense, at the meeting of the Club Jan. 27.

Chiccory—How is it Grown?

Mr. John G. Bergen.—I want some information about growing chiccory and preparing it for use; and I have no doubt that a great many others would be glad to know how to grow an article that is so extensively used both in this country and Europe as a substitute for coffee. In my family I must say that coffee and chiccory mixed is preferred to pure coffee, and I want to know whether I can grow it easily.

Mr. Solon Robinson.—Just as easily as you can grow parsneps or salsify, which chiccory very much resembles. I have quite a plot of it now upon

my farm. I bought the seed last spring at Thorburn's, in John street, and it was planted in drills, side by side with carrots, and treated in the same way, and will yield probably half as much per acre. The roots may be dug, as parsneps are, in autumn or spring, and when once in the ground are about as difficult to eradicate as horse-radish. We dug some of the roots this winter, washed, and sliced, and dried them, and then browned and added to the coffee as much bulk as there was coffee, and find the beverage not deteriorated in value, so far as the taste, smell and pleasant flavor are concerned. Where chiccory is grown as a crop it is dried upon a kiln, such as the hop growers use. It may be dried in any way that fruit, roots or herbs are dried, and it may be kept as well as any of those articles. As to its value for family use, I have no idea that it is any more deleterious than coffee, and certainly not as much as tobacco. Its value, commercially, I cannot give, but believe that it can be grown and sold in a green state at the price of potatoes. There is no market for the roots in a green state, but the dried article is salable, and is largely imported. It is a pity that all that is used in this country could not be grown here.

Dr. Trimble.—I hope this Club will not recommend the cultivation of chiccory, because its use is deleterious to health; its effect is intoxicating.

Mr. Solon Robinson.—I do not recommend its cultivation or use; nor do I recommend tobacco, rum or coffee; nor do I refuse to tell others how to grow corn, because it may be converted into whisky. We are constantly recommending the cultivation of grapes, and telling how to make wine. I think that we should give information to people who desire to grow chiccory, and I am glad to hear Mr. Pardee offer to procure such information.

Mr. John G. Bergen.—If the Club decide not to give any information or encouragement to the growers of chiccory, in a moral point of view, let us also refuse information about hops, and barley, and tobacco. As to the price of chiccory, I find that a short time since it was worth ten cents per pound; now, twenty cents, in a dried state, ready for use; and I believe at this price it is better for the country to grow it, than import it.

Flax Growing in Iowa.

Mr. Solon Robinson read a letter from Tipton, Cedar county, Iowa, asking information about machinery to clean flax.

The writer thinks that if Iowa farmers had some way of converting the flax straw into a salable product, many of them would grow flax instead of wheat, which fails about half the time to make a remunerating crop, while flax almost uniformly produces a good crop.

The Secretary.—The Club appointed a committee last year to examine and report upon Messrs Sanford & Mallory's flax dressing machine; and the managers awarded it a gold medal.

"Winter Care of Manure" was decided to be the subject for discussion at the next meeting.

Adjourned. JOHN W. CHAMBERS, *Secretary.*

January 20, 1863.

Mr. George Carpenter in the chair.

Rodgers' Hybrid Grapes.

Dr. S. J. Parker, Ithaca, N. Y.—Mr. Edward S. Rodgers and his brother, residing at Salem, Mass., have originated a large number of hybrid grapes. Having eaten four varieties of these grapes, I am more favorably impressed with their value than I expected to be. The following is my opinion of them:

No. 1. This grape will ripen wherever the Isabella ripens well. It is a large white grape, with colored cheek; very showy; flavor good; promises to be a good white grape.

No. 3. Is an amber or red grape. Bunch large; also the berry. Is every way an excellent grape; is earlier than the Isabella or Diana; sweet and pleasant; like all these hybrids, showy; and a fine market fruit.

No. 4. Has a large compact bunch, with large berries; resembles the Ontario as to size and color; black, sweet and pleasant; is as good looking as Wilmot's Hamburg; also a fine market grape.

No. 15. This grape has the largest bunch of all I have seen; berry large, red or Diana colored, sweet, but has a little native or foxy flavor. The fine appearance of this grape will make it salable everywhere.

These are all I have seen of these hybrids, which are forty in number. It has been objected that they are rough and foxy, with a little pulp, and too hard to be agreeable; but it must be recollected that the fruit shown has been grown near Boston, and, let our Boston friends say what they may, grapes of any variety grown in that vicinity are harsher than in good grape regions. I hope they will have a fair trial by American vineyardists.

Grapes that Promise Well.

Dr. S. J. Parker.—I have named the Rogers' hybrids as worthy of trial. The following are also meritorious: Cynthiana, or Texas Red river; there is also a Red river grape from Arkansas; both are vigorous growers, and ripen their wood well at the north, as far as the middle of the State of New York. The Cynthiana has bunches large, berries loose, medium size, blue color, a good table grape. Mr. Huntsman, of Massachusetts, says it is one of the best reliable native grapes.

Albino, a seedling raised by Mr. J. B. Garber, of Columbia, Pa., thirty-five years since. Bunches small; berries medium; color, greenish white, transparent; honey sweetness if perfectly ripe. In cold regions it needs to be laid down in winter.

Creveling, also called Cattawissa, Columbian, and Bloom, originated in Columbia county, Pa. This grape is similar to the Isabella, but earlier and superior in flavor, and was found wild. It is a little rough, but esteemed by many.

Mary Ann. This grape was raised from seed received from North Carolina more than thirty years ago, by Mr. J. B. Garber, of Columbia, Pa., and named after his daughter. Bunches and berries medium; color black; juice red; ripens early, about first of September; very hardy; fully equal to the Isabella; valuable for being so early.

A grape known here as the White Clinton, or White Delaware, is of a greenish white color; thin skinned; medium flavor; small bunch and berry; grows on a wild looking vine, with thin green leaves, or leaves with a down on the under side, easily torn. This grape is esteemed by many.

Rocky Mountain Seedling No. 2. This grape was grown from seed brought from near Salt Lake by the Rev. S. Parker. It is similar in leaf and wood to the Delaware, and in size and color of bunch and berry very much resembles it, but its skin is thicker; has a high flavor, which is very peculiar, and makes a fine aroma for wine, and keeps well.

Ontario. This grape has a very large bunch and berry, very compact, although the flavor is not of the first quality. Could a hybrid of this and the Delaware be made, it would be a great acquisition. The vine grows well, and is perfectly hardy; color of fruit, blue black; same pulp, with clear juice. This will make a good market grape. If cultivation would improve its sweetness and flavor, it would command unusual attention.

Mr. W. S. Carpenter.—The Rodgers hybrid grapes, mentioned by our Ithaca friend, I have seen, and was very much pleased with them, but I do not think they are equal to some seedlings already introduced, although some of them are very superior. Great credit is due to Mr. Rodgers for the trouble taken by him in producing these new varieties.

Mr. Pardee.—I am familiar with a great number of seedling grapes that have been introduced within the last ten years. If I was to make a selection for a vineyard, I should place, first, the Delaware, then the Diana, Concord and Hartford Prolific; a vineyard would not be complete without a few Isabellas. The Iona is a new seedling, which promises well. The Adirondac grape, introduced to our notice during the past year, is a good grape for northern New York; the skin is thin, but the pulp is rather watery, and lacks flavor.

Mr. Carpenter.—I would like Mr. Pardee's opinion of Allan's hybrid in comparison with the Anna.

Mr. Pardee.—The Allan hybrid, I think, is equal to the Anna. We shall have a great number of new seedlings during the next few years, but I would confine myself to the cultivation of a few of the best kinds. I have noticed that the Concord only produces about half the quantity of fruit as the Isabella.

Mr. Carpenter.—Is not that an advantage? The Concord generally produces all it can ripen. We know the Isabella is a profuse bearer, and sometimes does not ripen the fruit. Dr. Underhill thinks that at least four-fifths of the fruit of the Isabella should be taken off—the labor of doing so is very tedious and expensive.

I know a gentleman who cultivates great quantities of the Concord grape, from which he makes excellent brandy, which sells at eight dollars per gallon, eight gallons of the juice make one gallon of brandy, which is equal to one dollar per gallon for the juice. There is vacant land enough in Texas for immense vineyards.

Mr. Oliver, of Fordham, N. Y.—The Isabella does not ripen well with me; I have visited a number of vineyards and find that the general complaint. We have now 3,500 vines of the Concord grape, and intend to have a vineyard of 17 acres; the vines are very thrifty and we find no diffi-

culty in making them grow. Wine made from this grape is of a very superior quality.

My partner tried a large quantity of the Delaware vines, but was very unsuccessful in making them grow.

Mr. Pardee.—The experience of the gentleman in relation to the growth of the Delaware has not been like mine; we all know that the demand for this grape was such, that every means was used for their rapid propagation; root grafting and raising vines from the eyes under glass, was resorted to to produce them; by this means the vines were very delicate, and many persons became dissatisfied, because they failed in getting strong, healthy vines, but where they are raised from layers or strong well ripened cuttings, they grow vigorous, and after a year or two become good vines.

Mr. Carpenter.—You may raise thousands of seedling grapes and fail to get one that is equal to the Concord; most all the seedlings that have come into favor, have been the result of chance. A gentleman in France has some very fine seedling varieties of apples and pears; I understand he has now upwards of one hundred varieties.

He takes the well developed seed from the best varieties of fruit, selected with great care; these are planted in a hot bed; when they are three or four inches high he transplants them into the open ground, five or six inches apart; these are taken up two or three times, the tap root cut off, and the roots shortened; the next year he heads them in, so that in about six years he gets them into bearing; from these he selects the best kinds.

I would here mention that our friend Isaac Buchanan, has produced some choice varieties of Petunias; a few days since I had the opportunity of examining six new kinds, they were all fine flowers, beautiful in form, and brilliant in color.

Mr. Pardee.—Flowers in general are single, but by high cultivation, by hybridizing, &c., gardeners have produced double flowers in a great variety of colors.

In raising flowers from seed, you should remove all single flowers, or else your seed next year will produce a great number of single flowers. I have grown the choice varieties of Asters and Balsams, and by leaving a single plant growing among them, the seed the following year deteriorated so much the flowers were nearly worthless.

Mr. Adrian Bergen.—We must not rely too much upon planting seed to procure good fruit. A great many persons who plant the seed saved from fruit they have eaten, are disappointed in not getting as good fruit as that from which the seed was saved. Persons who do this must have great patience, and when they fail must try again and again. I prefer grafting from choice trees to planting seed from choice fruit; by following this course I know what to expect. New varieties are only got by planting seed, but it is a great chance; you may try many times and fail in the result.

Mr. Carpenter exhibited the Northern Spy apple. The specimen was in fine perfection, and the flavor excellent.

Mr. Thompson.—The Northern Spy apple, grown on my daughter's farm, at Glen Cove, this year, was the only apple that retained its usual size.

Cultivation of Asparagus.

Mr. Pardee.—We must all remember that the asparagus is a marine plant, and, to raise it to perfection, salt must be applied to the bed yearly. I have been very successful in raising this plant. It was my constant habit to empty the old brine from the beef and pork barrels upon the beds, and always succeeded in raising asparagus of a superior quality. In answer to the question how to prepare asparagus beds, I will say: First, underdrain the soil. If that cannot be done in the regular way with tiles, dig the bed four or five feet deep, and fill a foot or two of the bottom with rubble stone, and above that old litter of any sort, including chips, rotten wood, sods, etc., then soil well, mixed with compost manure, thoroughly worked, and in this set the roots six inches down, and by and by level off the bed. Keep it well worked and rich. A bed thus prepared and kept will last for years.

Chiccory—Its Use and Growth.

Mr. Solon Robinson presented several roots of chiccory grown upon his farm in Westchester county, and also specimens of the dried roots prepared for use in a domestic way, in which, and his statement relating to it, the members appeared to take a deep interest. The roots are about half the usual size of parsneps, and, in Mr. Robinson's opinion, half as many bushels per acre may be counted on as a crop. Mr. Robinson said that he did not present these specimens, and call up this subject again, to induce any one to cultivate or use chiccory, but simply to show how easily it can be grown by any farmer that desires to do so. He procured the seed at Thorburn's, in John street, being particular to inquire for the kind that is grown for roots, and not as a forage plant, as one kind, called succory, is, in England. It was sown upon corn-stubble land, moderately rich, alongside of carrots, in May or first of June, and treated in the same way; and this prepared article was made of roots dug a few days since, washed and cut into thin slices, and dried upon a wire screen in one day over the stove. It is now to be roasted and used just like coffee, mixed with it or rye, or in a pure state. As to its use being deleterious, he had no idea that it was as much so as coffee or tea. If used too freely it is said to be diuretic, and that it affects the nervous system. So do tea and coffee. If mixed half and half with coffee, it would be hard to detect it in the article prepared for the table. Mixed with rye the beverage certainly has a strong likeness to coffee in looks, odor and flavor. As farmers generally drink coffee—as they must or will have some warm beverage with their meals—why not use chiccory, and why not grow it in their gardens? He thought the Club might do a great favor to the country by recommending it. If it is deleterious, the people of England, France, Belgium and Germany would have discovered it before this, for it is extensively grown and used there; and, indeed, it is much more extensively used here than people are aware of, or else why such quantities imported? And if used, why should it be imported, when we can grow it as easily as any other root crop, and prepare it for use in any way that roots, herbs or fruits are dried.

Mr. R. G. Pardee read the following extract from the American Encyclopædia about this plant:

"Chiccory, or succory, or the wild endive, is a plant of the dandelion family; grows wild and profusely in England and other parts of Europe, and is also naturalized in America. The root is fleshy and milky, and is cheap and pleasant, but has but little nutriment, and none of the essential oil or aromatic flavor of coffee.

"In cases where it is used for a long time, its effects are deleterious, especially upon the nervous system; not so much so, however, as coffee. It was formerly used for medicinal purposes, and is still thought by some to be beneficial in the early stages of jaundice and visceral obstructions, etc.

"It is now employed almost exclusively as a substitute for coffee; and, notwithstanding its cheapness, it is often adulterated with roasted wheat, rye, acorns, carrots, and other more objectionable articles. Large crops of chiccory are grown every year in England, and is cut, dried, and reduced to powder, when it resembles in color ground coffee without its qualities. It blossoms in August and September, with bright blue flowers, on a stem rising from one to three feet, when grown wild, but when well cultivated the stem rises to the height, sometimes, of six feet. Cultivate like parsnips or carrots. Great Britain produced 12,500 tons of chiccory in 1850. The British Parliament has sanctioned its sale, only labeled when sold mixed with coffee."

Mr. Charles F. Erhard, of Ravenswood.—The blossoms were not always blue, but vary in color like asters. The plant grows wild just as carrots do upon Long Island, though I was not aware till now that it was the same as the one cultivated, nor had I any idea that an article that I have long used as a substitute for coffee in my family, could be so easily grown. I think that hereafter I shall grow my own chiccory.

Mr. Van Antwerp.—The roots shown to-day by Mr. Robinson are larger than any I have ever seen. I have understood that the roots imported from Germany are a smaller variety, which is preferable to use in place of coffee; but experiments will soon prove if this is so.

Dr. Church, of New York.—The botanical name of chiccory is *Cichorium Entibus.* The succory, used as forage plant, *Cichorium Endiva.* The dried chiccory roots have been an article of commerce for a long time, and have sold at six, seven and eight cents a pound, and at present considerably higher. I do not think its use deleterious, unless taken in immoderate quantities.

Mr. Carpenter.—I have been in the habit of condemning the use of chiccory, but from the testimony of a number of friends who have used it, I think I have been in error. Our farmers can certainly grow this root at two cents per pound. Allowing that it does lose three-quarters of its weight by drying and roasting, it can be placed on our tables at farthest at ten cents per pound. Now that the price of coffee has advanced to over double its former price, chiccory will be grown to an unlimited extent. I think it is our duty to recommend it to the attention of American farmers.

Mr. Solon Robinson.—As to the objection to growing chiccory, that if once got into the ground it can never be got out, the same objection rests against carrots, parsnips, horse-radish, Jerusalem artichokes, and I do not know how many other plants. A correspondent of the *Country Gentleman* says:

"We recently treated our friends with a dish of coffee made of chiccory, rye and wheat bran stirred up with molasses and browned like the other ingredients. It was pronounced very good, and they were surprised to learn that it contained not a particle of coffee. The root is very solid and does not shrink very badly in drying, so that a rod square will furnish an abundant supply for a family for a year.

"Wash the roots clean, slice in thin pieces, dry in the sun or in a moderate oven, and brown and grind the same as coffee. It is stronger than the pure coffee in equal quantities, gives a good color to the decoction, but does not settle quite as clear as does the genuine article. It is an ingredient in all the burnt and ground coffee sold in the market. The flavor is agreeable to most persons, and used as a partial substitute for Java it does very well."

The Grade of Country Roads.

Mr. Solon Robinson.—The following letter has been sent to me:

"I think you have fallen into a great error, in making the remark, during the last meeting of the Farmers' Club, that railroad horses wear out so soon because they continually travel on a level, or nearly a level. This popular error should not be supported by your authority, which is certainly considered unimpeachable by many. On the contrary, I should like to see you enlisted on the side of those who try to conquer this error, which has done and is doing much mischief in preventing improvements in the grade of country roads. Will you please read the enclosed to the Club, and let us have some decision on the subject?"

"UNDULATING ROADS.

"There is a popular theory that a gently undulating road is less fatiguing to horses than one which is perfectly level. It is said that the alternations of ascent, descent, and levels, call into play different muscles, allowing some to rest while the others are exerted, and thus relieving each in turn.

"Plausible as this speculation appears at first glance, it will be found on examination to be untrue, both mechanically and physiologically; for, considering it in the former point of view, it is apparent that new ascents are formed which offer resistances not compensated by the descents; and in the latter we find that it is contradicted by the structure of the horse. The question was submitted by Mr. Stevenson to Dr. John Barclay, of Edinburgh, no less eminent for his knowledge, than successful as a teacher of the science of comparative anatomy, and he made the following reply: 'My acquaintance with the muscles by no means enables me to explain how a horse should be more fatigued by traveling on a road uniformly level, than by traveling over a like space upon one that crosses heights and hollows; but it is demonstrably *a false idea*, that muscles can alternately rest and come into motion in cases of this kind. Much is to be ascribed to prejudice originating with the man, continually in quest of variety, rather than with the horse, who, consulting only his own ease, seems quite unconscious of Hogarth's Line of Beauty.'

"Since this doctrine is thus seen to be a mere popular error, it should

be utterly rejected, not only because false in itself, but still more because it encourages the making of undulating roads, and thus increases the labor and cost of carriage upon them.

"GREATEST ALLOWABLE SLOPE.

"A perfectly level road is thus seen to be a most desirable object; but as it can seldom be completely attained, we must next investigate the limits to which the slopes of a road should be reduced, if possible, and determine what is the steepest allowable or *maximum* slope.

"This depends on two different considerations, according as the slope is viewed as a descent or as an ascent, each of which it alternately becomes, according to the direction of the travel.

"Viewed as a *descent*, it chiefly concerns the safety of rapid traveling, and applies especially to great public roads.

"Viewed as an *ascent*, it chiefly concerns the draught of heavy loads, and relates particularly to routes for agricultural and other heavy transportation.

"The slope should be so gentle that when a heavy vehicle is descending its gravity shall not overcome its friction so far as to permit it to press upon the horses. This limiting slope corresponds to the 'angle of repose' of mechanical science; *i. e.*, the angle made with the horizon by the steepest plane down which a body will not slide of its own accord, its gravity just balancing its friction, so that the least increase of slope would overpower the resistance of the friction, and make the body descend. This 'angle of repose' should therefore be the limit of grade upon all country roads, so far as possible."

Mr. Robinson.—I did not intend to be understood as objecting to a level grade for roads, in what I said, because I know their advantages, and that if horses do wear out faster, we can afford to wear them out.

"Chiccory, its Uses and Growth," was continued as one of the subjects for discussion at the next meeting.

Adjourned.

JOHN W. CHAMBERS, *Secretary.*

January 27, 1863.

Mr. John G. Bergen, of Long Island, in the chair.

Increasing the Size of Eggs.

Prof. Mapes called the attention of farmers to this subject.

He exhibited specimens weighing 3¼ ounces each of eggs, produced by a Mr. Pyatt, on the Lyons farm, near Newark, N. J., by improvements in the white Spanish fowls. He is careful to select such hens as lay large eggs to propagate from, and sells off or uses on his table all that do not come up to his standard of excellence. This is a matter to which farmers might profitably give more attention.

The Chairman.—Not as long as the custom prevails of selling eggs by the dozen, and small ones for just as much as the largest.

Mr. Solon Robinson.—I have long advocated selling eggs by the pound,

with a view to work out this very improvement. A pound of eggs ranges from 7 to 14, by count, as sold in this city. But, after all, even if sold by the pound, as I contend that they should be, as well as all other farm produce, the question rests upon the cost of production. How much corn will make a pound of meat, or a pound of eggs? and are large fowls really more profitable than small ones, and are large eggs richer or more valuable than small ones by the pound? We know they are by the dozen.

The Rev. Mr. Weaver, of Fordham, inquired if the Club could recommend the Spanish breed of fowls? In his opinion they are very tender, and do not usually lay well in winter.

Mr. Carpenter confirmed this opinion, and thought the Polands much preferable.

Early Samaritan Potatoes.

Mr. Simeon Allen, East Chatham, N. Y., presented some specimens of this potato; he claims that this is one of the earliest potatoes known, and that potatoes could be dug in eight weeks after the tops are visible. No rot has shown itself after fifteen years' experience.

Mr. Solon Robinson.—I think the potato is identical with the one grown in Connecticut for nearly half a century, known there as the English white, but was not considered a very good one.

Tomatoes.

The Secretary read a letter from Mr. Joseph Gaskell, Oconee Station, Illinois, asking the Club to name the best early tomato, or one that will ripen before frost in Illinois and Wisconsin.

Mr. Wm. S. Carpenter.—The earliest sort of tomatoes grown about here are medium sized, smooth skin, and very poor quality, nothing like as good as the Feejee or Lester, which are identical. The only way to get early fruit is to grow early plants.

Prof. Mapes.—The market gardeners not only grow early plants in hot-beds, but they get early fruit by pruning off all the tops and branches, so that the plant grows stiff and upright, and as it has but few to support, it is able to ripen all the fruit, and earlier than it would if all the fruit was left upon the vines.

The Chairman.—It is a question whether trimming of tomato plants on a large scale, will pay for the expense. To produce early tomatoes, the seed should be sown in a hot-bed in February; when they are about three inches high, they should be transplanted into another bed about four inches apart, and in May transferred to the open ground. Location has a great deal to do with early tomatoes. I have known tomatoes planted in a well sheltered field, where they had the full influence of the sun, ripen at least 10 days before those planted in a more exposed situation.

Does Freezing Spoil Apples.

Rev. Mr. Weaver presented some specimens of Spitzenberg and Glori Mundi apples, which had been stored in a box that stood out doors through our coldest weather and frozen solid. Yet they were now as sound, and of as good flavor as though they had been kept in a cellar. This is an im-

portant question, and it has been pretty well settled that apples, by once freezing, if kept entirely quiet until thawed will not be injured.

Mr. Carpenter said that he was well satisfied upon this point, that once freezing did not injure the apples, but that a repetition of it would spoil them, and so would any movement, such as rolling over barrels, or exposing them while frozen to a change of air by opening the barrels. He once shipped a lot of Newtown Pippins to England which had been frozen solid while lying in the barrels, and thawed undisturbed, and no shipment ever did better.

The Chairman thought it would make a difference what kind of apples were frozen; that sweet apples frozen only once, and thawed in any way, would be quite spoiled.

Chiccory.

The subject of chiccory being again called up, Solon Robinson read a letter from John F. Stillwell, South Amboy, N. J. He says:

"Born in a district of Germany where this root is much raised, and from which all that has come under my eyes in New York market has been imported, I have quite a concise recollection of the process. It is not much raised by large farmers, but more by those who lease a piece of land, or own but a few acres. The soil is a sandy one, very little approaching a light sandy loam, but of good depth. It must be well manured and plowed very deep. The manure used was oftener spread than plowed in, of good, rich quality by appearance, and must have been either cow or hog manure, as I know that these people had no horses. The seed was sowed broadcast, like carrots and radishes, and raked with an iron rake. Side by side I have seen plots of carrots and chiccory, treated alike, weeded and thinned out by hand, dug or loosened with fork or spade, and then pulled. Chiccory roots are about the same in size as carrots, from 1 to $1\frac{1}{2}$ inches in diameter, by 12 to 15 inches long. I presume that from this can be inferred that chiccory can be raised profitably under the present method of raising carrots in drills, with a nearly corresponding yield. The chiccory roots, when getting of a fair size, are dug little by little during the season, left on the ground long enough to dry the adhering sand, in order to make it shake off more easily, and are then taken to shelter. I have never seen them washed, which however might not have hurt them. The roots are now sliced and re-sliced from top to bottom, with pocket or other knives, and then by means of a machine, like a common straw-cutter, cut in pieces of about an inch long. The curing is performed upon boards, or drying frames made for the purpose by basket makers, of split willow shoots, exposed to the sun. I have seen it cured in ovens or kilns, but it was not considered to be as good. In this climate it would dry very fast exposed to the sun. To be marketable for the roaster or factoryman it must be dry enough to rattle when shaken, or crack when breaking in two one of the small pieces. After curing, care must be taken to prevent its heating and molding, by keeping it in heaps not too large, or when for want of room obliged to have it in large heaps, it must now and then be shoveled or forked over. The process of raising, harvesting and curing of which I speak, was carried on twenty years ago; that space of time

may have introduced new modes and methods. To make it pay in this country, Yankee ingenuity would have to introduce a quicker mode. The price at which it is retailed at present in New York would entitle the grocer to about 4 cents a pound from the coffee-roaster. I think there is $2\frac{1}{2}$ or $3\frac{1}{2}$ cents per pound duty on the same, which alone would pay a large price per acre. I have often heard the remark that it paid well at about $1\frac{1}{2}$ cents a pound, and I know that before the tariff it was imported in New York for less than 4 cents a pound, dried. It is retailed now at $12\frac{1}{2}$ cents a pound. About 10 per cent. will, if added to almost any good coffee, improve its flavor, and more so with coffee of inferior quality. It is the best substitute for coffee as far as my taste is concerned, and is by many considered much healthier."

We find by reference to the tariff act, that the duty is 3 cents a pound.

Insects Injurious to Farmers, and those not so.

Dr. Trimble, of Newark, N. J., gave the Club a most interesting lecture upon this subject, illustrated by colored plates, without which we could not make a report interesting. One of the most instructive points was the description of insects that are beneficial, not injurious, to farmers. In this class are the common "lady bugs," which some people try to destroy. Almost every destructive worm has its parasite. Even the small plant louse is destroyed by a smaller insect that deposits its eggs in the body of the doomed apples. He said that all insects, although many of them appear to be great pests, seem to have a purpose in the order of nature. Some one asked him of what use are musketoes. He replied, let us see. If you take two pails of rain water, that are stagnant enough to breed musketoes, and cover one with gauze so that none can get in to deposit eggs, and leave the other open until it is alive with the young musketoes, you will find that the water grows purer and more fit for use every day, while that in the other is growing less and less so. May we not then conclude that the insects serve a purpose in keeping the water of marshes from becoming stagnant, putrid, and a cause of sickness.

It was the unanimous desire of the Club that Dr. Trimble should continue the subject at another meeting.

Subjects for discussion at the next meeting, "Winter Care of Manure," and "Insects Injurious to Crops."

Adjourned. JOHN W. CHAMBERS, *Secretary.*

February 3, 1863.

Mr. Edward Doughty, of New Jersey, in the chair.

Chiccory.

The Secretary.—Since the last meeting of the Club I have received the following letter from Mr. Pierpont Phillips, of Pomfret, Conn., in reply to a communication I sent him, asking him to give the Club his experience in

growing chiccory, and whether he had discovered any deleterious effects from its use:

"Yours of the 24th inst. is received. I have grown chiccory for family use for some years, and have distributed chiccory seed among my neighbors, and have encouraged them to grow it.

"It is as easy grown as carrots or parsneps, and requires about the same sort of ground and preparation. I grew a little slip in the garden last year—thirty-five by five feet; four rows which produced thirty-three pounds of dried root. I sow the seed in May; take up the roots in October; wash them to free them from adhering dirt; dry and cut up in about one-half inch pieces; partially dry them by spreading in the open air and sunshine, and finish by drying in the oven. If grown in large quantities for market, it should be cut up by some machine and kiln dried.

"From my experience in this small way, I think from 5,000 pounds to 8,000 pounds of the dried root can be grown per acre.

"I have used chiccory for several years, sometimes clear, as a substitute for coffee—sometimes mixed with coffee. All the family like it, and no bad effects have been observed. Two of my neighbors say they cannot use coffee without producing headaches, but have no headaches from the use of chiccory.

"The high price of coffee will induce more persons to grow chiccory this year than ever before."

Mr. P. T. Quinn, who conducts Prof. Mapes's farm, said that he had dug 756 bushels of carrots from an acre, which would weigh 56 pounds per bushel, making 42,000 pounds of the green roots. As Mr. Robinson estimates a crop of chiccory at half the bulk of a carrot crop, it seems likely that Mr. Phillips's statement is correct for garden culture, as the roots will not shrink three-fourths in drying; but such a crop of carrots as this must not be expected from anything short of garden culture. I plowed the land, said Mr. Quinn, with a strong four horse team, turning it sixteen inches, and subsoiling. It is a heavy job to dig such a crop. The large subsoil lifter is first run along the rows, and then the roots have to be loosened at the bottom with forks.

Substitutes for Corn and Wheat.

Mr. L. S. Pennington, Shiling, Illinois, writes as follows:

"Our corn crop for three years past has failed to be remunerative for the want of a market, and our wheat has scarcely paid for harvesting and threshing, owing to a general failure in the crop (in Northern Illinois). Of a necessity we must look for other articles of production. Can you not give us some trustworthy information through your Club, or otherwise, to the market value of the flax product, and the best machinery (cost considered) for preparing it for market."

Upon this an animated discussion arose, as to what the Illinois farmer would substitute, in part, at least, for the almost universal corn and wheat crop.

Mr. Carpenter earnestly recommended white beans, because they always sell at a price that would better pay for transportation than either of the

cereals. The present price is $2.75 a bushel, and is never less than $1.50. An acre of poor land will produce thirty bushels.

Mr. Pardee.—I think white beans could be cultivated at a profit. I have never known white beans in Western New York sell for less than $1 per bushel.

Mr. S. Robinson.—There are one or two trifling little obstacles in the way of the Illinois farmers going largely into the cultivation of white beans. In the first place the soil is so rich that the same kind of beans that grow here upon thin land in short stubbed bushes, would there grow in long succulent vines, very difficult to cure, and in wet seasons almost impossible. There is but one way in which a crop of beans can be cured in a wet season, when pulled in a green state. This is to set stakes like ordinary garden bean poles, and stack the vines with roots to the stake, just one tier thick, and about five feet high. There should be brush, stones, sods or something at the bottom to keep the pods out of the water, and in this situation the greenest vines will cure. There is no farm crop more liable to injury than white beans, and none that varies more in price. Although it is now high, it has been as low as one dollar a bushel within three years, and if a tenth of the corn ground in Illinois was used for beans, and the crop sent to New York, it would glut the market. I do not think that it will do for this Club to recommend beans as a general crop, or substitute for corn and wheat in Illinois. There are always many difficulties in the way of a farmer changing from one routine of crops to another. He may be compared to a loaded cart in deep ruts, which is too heavy to go back, which cannot turn out, and therefore must be dragged forward.

Mr. R. G. Pardee.—I think the most sensible change would be to flax. That only needs a combined effort by a few farmers, as it is requisite to have a flax mill in the vicinity, to make it profitable. A few years ago flax was extensively grown in Western New York for the seed, the business being encouraged by owners of oil mills. When grown for seed, the crop is mown or cradled. Tangled flax, such as used to be thrown away, would now be valuable, if for nothing else, certainly for paper. I should think that flax was one of the most promising crops for Illinois. The seed is always salable, and so is the oil and oil cake. There is nothing better for stock than a little oil cake meal, daily added to their food. Some of the oil mills of this State, twenty years ago, I know, exercised a good influence fifteen miles around.

Prof. Mapes.—It is a curious fact that we import flax seed from Odessa in large quantities, and export nearly all the oil cake to England, where it sells at a higher price than the cake made there. There are several processes for preparing flax without rotting, which is a tedious operation. At present prices of stock there is no doubt that flax would be a good crop for paper; but the great difficulty is in the want of unity of action necessary to make flax growing profitable in Illinois. Mills for using the seed and preparing the lint for market are wanted near to where the crop is grown. It will not bear transportation in its rough state to the seaboard. Years back, after the seed was gathered, the straw was burnt off. Last year we had a new machine exhibited, made by Sanford & Mallory, of this city, which made a great saving in the produce. A Mr. Billings, some

years since, introduced a machine and apparatus for rotting flax and hemp, by keeping it at a temperature say ninety deg. I think it a geographical difficulty; our country is too new; our population is too much separated to work to advantage.

Mr. Adrian Bergen.—We tried flax some years ago upon Long Island, but had to give it up, because it was not a profitable crop. The labor of preparing it by hand for market is altogether too great.

Mr. Solon Robinson.—The following direction in relation to growing flax was prepared by Messrs. Harry Wilcox and Enos Durham, extensive flax growers in Washington and Rensselaer counties, New York:

"Generally any good corn land will grow good flax, but (we consider) the best land in our section is an upland gravelly loam, which yields the finest lint, and is generally best coated. Seed should be sown as early as possible, but not so early as to be injured by frost. One bushel of seed to the acre, as a general thing, would be sufficient, but when the land is strong five pecks would be better. We generally sow from the 5th to the 10th of May. If the land is rolled after sowing the seed, the crop may be cut with the reaper instead of pulling—it would also benefit the crop.

"The time to pull or harvest the crop is when the stalks begin to turn yellow, and the leaves to drop off. The cost of pulling per acre is from $5 to $8—when pulled or cut it should be placed on end or bound in bundles, of from three to four inches in diameter, and stacked in small shocks, so that the air can circulate through it freely until dry; then it should be taken to some convenient place for taking off the seed, with a machine for that purpose. The flax is taken in both hands and passed down through the pulleys or rollers until the balls are all broken, the seed dropping below.

"The flax for retting or rotting should be spread on grass land, and if in dry, warm weather, early in the season, it ought to be spread on low meadow land; if late in the season, any grass land is suitable. At any season of the year it should be spread thin, not more than one pound to two feet running measure. It should be allowed to remain until the fiber turns silver gray, then turn and let it remain until the other side is like the first. In turning, a pole is used from eight to ten feet long. If the weather is rainy, and the straw in consequence is liable to be over retted or rotted, in order to save it, it should be placed on end in small shocks, of from two to three feet in diameter, and remain until dry weather. When dry, it should be bound in bundles of convenient size for handling, and either stacked like oats, and thatched on the top, or placed under cover. If stacked, the seed ends should point to the center of the stack.

"One year with another, one acre of good corn land will yield one ton of retted or rotted straw, an average of from ten to twelve bushels of seed, and an average of from 400 to 450 pounds of lint (if the most approved machinery is used in dressing), which is now worth in this section twenty-five cents per pound. We sometimes let out the whipping off the seed and rotting, and the average price paid is $3 per acre."

Mr. W. S. Carpenter.—Clover and timothy seed always sell at good paying prices.

Mr. Solon Robinson called the attention of Illinois farmers to the fact

that dried peaches are regularly sold higher in this city than raisins, and that there is no better place for the growth of the fruit than Southern Illinois; and that it certainly should be produced as low as raisins, which pay a large duty, beside cost of production.

Mr. Lancaster.—We import largely of silk. I hope the time will come when silk will be produced in our country. I would suggest hops.

Mr. Carpenter.—The cultivation of the hop is very precarious in our country. I know, some years since, the farmers of Delaware county quitted the making of butter, and went largely into the cultivation of the hop, but at that time hops sold for such a small price in this market, that they soon returned to the making of butter.

The Secretary.—Hops are now in great demand since the brewing of ale and lager bier has so increased in our country. Large quantities are exported to England, where they sell for remunerating prices.

Mr. R. G. Pardee.—I see among our visitors to-day, Mr. R. C. McCormick, Chief Clerk of the Department of Agriculture at Washington. I hope he will give us some information in what is doing in that department.

Mr. McCormick.—I have risen from a sick bed to attend the meeting of the Club to-day. I came as a listener, and did not expect to say a word to-day on the importance of agriculture. I congratulate you, gentlemen of the Farmers' Club, that the government of the United States has established the Department of Agriculture; the interest of the farmers of the country will doubtless sustain and cherish it.

It is true, the Patent office has done a little in this matter, but from the time of Washington to the present, agriculture has never occupied any distinctive position in our government.

The Department has commenced the formation of a museum, in which is already collected a number of things of interest to the agriculturist; among them are specimens of cotton grown in sixty different sections of Illinois; the specimens are very good, and there is no doubt that cotton can be raised in the whole of the southern portion of that State.

Sorghum is rapidly becoming an important crop in Illinois and other western States. From statistics received at the Department, it appears that about forty millions of gallons of sorghum syrup were manufactured out of the crop of 1862.

Experimental gardens have been established at Washington, and it is intended that others shall be located in different sections of the country. The objects and aims of these gardens are to procure and encourage the transmission of seeds, cuttings and plants from all sources, both foreign and domestic, for the purpose of testing their merits and adaptation for particular locations and climate of our country, to ascertain by experiment the influence of varied modes of culture, to investigate the various maladies and diseases of plants, the insects that destroy them, &c.

I am pleased to see that there is a growing taste for agriculture, and that gentlemen who have amassed fortunes in our city, hie to the rural districts and make it the height of their ambition to possess fine farms.

I see before me men who have been educated to the plow, and I rejoice to know that such men meet weekly to discuss important subjects connected with agriculture, that are constantly coming before the Club.

And when peace again shall occupy our borders, when our swords shall be bent into plowshares and our spears into pruning hooks, and we shall again be one and a united people, agriculture will occupy one of the noblest positions in our country's history.

Paper from Indian Corn Husks.

Mr. McCormick.—I beg leave to present for your inspection a variety of specimens of paper made from Indian corn husks, which have been forwarded to the Department of Agriculture, with the following description:

"The consequences of the enormous paper consumption are felt more and more, because the paper manufacturers meet every day with greater difficulties to procure a sufficient supply of raw material necessary for the working of their factories. The rags, which are mostly used for the paper pulp, cannot be produced at will, like other raw materials. The supply is confined, as well in regard to quality as quantity, to a certain limit, influenced by the activity of the rag gatherers.

"It is, therefore, evident that the moment must come, sooner or later, when it is absolutely impossible for the paper manufacturers to keep pace with the paper consumption, if they should not succeed to discover a satisfactory substitute for rags. Indeed, their exertions have been directed to this for years; and experiments, tried not without success, have proved the existence of many materials containing fibers which might serve as a substitute for rags. But few are adapted for manufacturing purposes, partly because most of them are too costly, and partly because they cannot be produced in sufficient quantities. Only plants of culture are produced in great quantities. Of these, the maize plant is the best adapted for paper manufacturing.

"In the last century two maize straw paper manufactories were in existence in Italy, according to Dr. Joh. Christ Schaffer's *Sä entliche Papierversuche*, Regansburgh, 1772, but the process seems to have been lost.

"A certain Moritz Diamant, from Bohemia, directed recently again the attention to the importance of the maize plant as a substitute for linen rags, and indicated a process for the transformation of maize fibers into paper pulp. He presented already, in the year 1856, to Baron Bruck, then Minister of Finance, a project with regard to it.

"The imperial paper manufactory (*Schlögelmühle*), near Gloggnitz, was consequently ordered to make, under Diamant's direction, out of a certain quantity of maize straw, paper. The produced paper was not satisfactory in regard to quality; also the cost of manufacturing proved to be considerably higher than that of rag paper. In consequence of such results the ministry of the finances was obliged to stop further experiments.

"Diamant, in 1859, made a second application to the Austrian Minister of the Finances, Baron Bruck, who consented to have a second trial made in the imperial paper mill, under Diamant's direction. Different kinds of paper were manufactured, partly writing, partly printing paper, which were not entirely satisfactory as far as quality was concerned. The cost was yet, in spite of all exertions to reduce, considerably higher than that of rag paper, which was principally caused by the great distance of trans-

portation of the raw material. It was proposed to undertake the manufacturing of the maize paper in a locality where maize is raised in sufficient quantities, and to take a middle course, by erecting, in an experimental way, a factory for half-stuff. The projected half-stuff factory was erected at Roman-sz-Mihály, near Temesvar, where the maize cultivation is extensive, and on the 6th day of March, 1860, it commenced to operate, under Diamant's provisional direction. The length of time fixed for experiments was one year. Diamant promised to manufacture in this period 500 cwts. half-stuff out of maize straw, a quantum which was not half reached. The produced half-stuff was, in addition to this, so poor that further experiments and the working of the factory were suspended, in consequence of Diamant's own suggestion, before the granted time had expired.

"The exertions of the direction of the Schlögelmühle paper mill, under whose superintendence the experiments were continued, aimed principally at two things: first, to reduce the cost of production through rational improvements in the mode of manufacturing paper; secondly, to investigate how the expenses would be, if, instead of the whole straw, only the fiber stuff of the shucks, (the leaves enclosing the corn ear), containing the fibers of the best and finest quality, would be used for manufacturing paper. If these industriously continued experiments did not lead directly to the desired results—*i. e.*, to make paper as cheap out of maize straw as out of rags—they led at least indirectly to it, and, what is of greater weight, to a very important result: *the discovery of a new fiber, capable of being spun or woven*, which (the fiber) furnishes us, in a waste, with a cheap paper. The genesis of this discovery is as follows: The basis of all paper is vegetable fiber. The rags are but the fibers produced out of the flax, hemp or cotton plant, and used up by wearing. If these fibers would be used for paper before they would be converted into textures, the paper would be certainly better, but also incomparatively more costly. Paper of maize straw is paper of unworn plant fibers.

"After the ideas had once run into this direction, the question was brought very near: Cannot the fibers of the maize plant, before they are delivered to the paper machine, just as well be worn as the fibers of flax and hemp are worn first? In other words: Cannot the maize fiber be spun and woven? All that was necessary was a trial. It was made and succeeded.

"It appeared that the maize fiber could be extracted out of the plant in a form like flax, by a procedure very simple, and at the same time requiring but little apparatus and auxiliary means; that it could be spun like flax, and be woven like the flax thread.

"The cultivation of this plant constitutes one of the most profitable branches of agriculture known. The plant, not taking the corn ear into consideration, which pays for itself already, the cultivation can be made useful in many different ways. Through the process applied for producing the maize fiber, the components of the plant are separated into three different parts, to wit: fibers, flour dough and gluten. The fibers are spun and woven; the nutritive substance (flour dough), which has the peculiarity to remain fresh for months in the open air—consequently to resist, unlike other unorganic substances, putrefaction—gives a pleasant tasting, nutri-

tive flour dough. All the fiber and gluten waste of the maize plant, which are precipitated during the process of extracting the fibers, are used for manufacturing paper.

"The most remarkable thing in regard to the process is its simplicity. The humblest laborer can learn the procedure, when he is but once instructed in writing, or verbally, and is enabled to effect the production of the above named articles on the maize field itself without the slightest expense, while owners of large farms, or manufacturers, can produce daily immense quantities in steam boilers."

Adjourned. JOHN W. CHAMBERS, *Secretary*.

February 10, 1863.

Dr. Austin Church, in the chair.

Potatoes.

Mr. John Van Antwerp, of Westchester county, exhibited some potatoes called by him the Mountain White; he thought them the same as was exhibited at the Club last week, under the name of the good Samaritan; they are sold under various names. The produce of the Mountain Whites was fifteen bushels for one planted.

Mr. Wm. S. Carpenter.—I have grown the same sort—they are not a new, though a very good variety. In answer to the question to name the best sorts, he said that of 60 kinds carefully experimented with, he preferred the three following, naming them in their order of excellence: Kusco white, Pinkeye rusticoat, Garnet Chili. These are seedlings originated by Mr. Goodrich of Utica, and except where early sorts are wanted, are well worthy the notice of farmers. He asked as a favor that all would take notice that he had none of the seed for sale. For early potatoes, he said that he preferred the early Algiers, though he thought the Buckeye a very good quality, but liable to rot and not very productive. The Pellham seedling is early, but a very poor quality; with him nearly worthless except for stock, and for that purpose no better than the old Merino. I have shipped both potatoes and apples to New Orleans; the freight per barrel is from 50 to 75 cts. I realized from $3.75 to $4.00, which pays a fair profit, but the market is uncertain and can be overstocked. Butter is worth more here than there.

Dr. Trimble said that the Buckeye was a favorite sort for early market use in Monmouth county, New Jersey.

Mr. Carpenter.—I would prefer for an early crop the Algiers, Dykeman, Mountain June, in the order named. As for Mercers, I have given them up entirely six years ago, but my neighbors have stuck to them, and suffered from the rot every year, until they are now willing to try almost any sort. I get my land in good order by deep plowing and pulverizing, plant early and use no manure, but give each hill a handful of ashes and plaster on the young tops.

Prof. Mapes.—I consider the Mammoth Nutmeg potato the best and

earliest in the world, but most unprofitable to grow as a salable crop, because they yield so very light. The flavor is very superior.

The Chairman.—I think highly of the variety known as Dovers.

Mr. Carpenter said that one of the poorest sorts here, the common Pink-eyes, sell the highest of any sort in New Orleans, probably because they bear shipment better than any others.

Illinois Hog-Scalder.

Mr. C. Harrington, Griggsville, Pike county, Ill., sends us the following description of a cheap, convenient hog-scalder:

"As the Farmers' Club has of late noticed the description of more than one hog-scalder, I may say to Mr. Robinson that many of our farmers in this vicinity use one of the following named dimensions and material: Outside measure, bottom six feet four inches long, and two feet two inches wide; top two feet eight inches. The sides and ends are made of two-inch pine plank, twenty-two inches broad. Two inches from the end, each side plank is rabbited three-eighths of an inch deep, and of sufficient width to receive the end plank close. Two-inch thin band-iron fastened by wood screws on the outside, and even with each end of the side planks, stretched from bottom to top.

"At each end and through these strips of iron and the side plank, two two-inch bolts, at proper distance from each other, with square heads and nuts, hold sides and ends firmly together. The bottom is made of sheet iron, one-eighth or three-sixteenths of an inch thick, covering fully the lower edges of the side, end and planks; put on with inch and a quarter or inch and a half wood screws, two and a half inches apart, each screw alternately three-fourths of an inch from each edge of the side or end plank, and you have a Prairie State Hog-Scalder, at a cost not exceeding ten dollars. Now let us use it.

"Dig a trench in the earth eight feet long, eighteen inches wide, eighteen inches deep, leaving the sides unbroken, and as near perpendicular as possible. Deposit the earth thrown out along the trunk, and on the side intended for the reception of the hogs. Place the scalder directly over the trench, and about six inches short of the end designed for discharging smoke. A few gallons of water in the scalder will aid in leveling it. A pipe six inches in diameter, eight or ten feet long, will carry off the smoke, if properly placed and fitted up in a perpendicular position. Clay mortar will make all tight around the bottom of the scalder and pipe.

"The top of the platform on which the scalded hog is first received should be of equal height with the scalder. To this, and near the latter, attach the ends of two trace chains or ropes, two feet apart, and an equal distance from each end.

"A small rope between these chains, two feet long, fastened to each near the middle of them, will keep them in proper position. The water being hot, the vat uncovered, throw the loose ends of the chains across, and roll a hog into the scalder, where he is easily managed, and from which two men roll him upon the platform easily by the chains. With these arrangements, half a cord of dry wood will be ample to heat water to scald one hundred hogs."

Flax Growing.

Mr. Solon Robinson.—I am in constant receipt of letters of inquiry about flax growing and flax machinery. I allude to it now to show how deeply the public mind is agitated upon this question. A letter in my hand from Mr. G. W. Shepard, Geneva, Ashtabula county, Ohio, says that great quantities have been grown there for the seed, the straw being of no value, for want of machinery to dress it at little expense, and he wants to know if we cannot recommend somebody to go there and set up machinery to save this product, which is now wasted.

The White Willow.

Mr. Solon Robinson.—The same gentleman inquires if the willow which grows common all over the country is not just as good for live fence as the white willow of Illinois.

Mr. Asher L. Smith, Lebanon, Conn.—The white willow is nothing new; there are plenty of the trees all over the country, just as good as those in Illinois, that will make a fence in swampy places, but they are not suitable for hedging a farm, because the roots take up too much room in the soil, to the injury of crops. If the willow is planted, and the shoots interlaced, a good live fence can be made; and I think the shoots might be cut for basket makers.

Mr. Carpenter said that he had lately seen a permanent fence in a wet place, made by setting willow trees twenty years ago, and cutting chestnut rails just long enough to fasten between them, so that the trees have grown over the ends, holding them firmly in place; and the general opinion of those present was that that is about the only way that willow trees can be used for fencing, and that they are only valuable in very wet places, where it is difficult to sustain any other kind of fence. The common willow will not do for making baskets.

Cultivation and Use of Willows.

FROM THE TRANSACTIONS OF THE HIGHLAND AND AGRICULTURAL SOCIETY OF SCOTLAND.

Willow makes the very best kind of charcoal, and is highly esteemed in the making of gunpowder. The bark is used for tanning several kinds of leather. So from this we may learn that the consumption of willows, if more extensively grown, might be greater; and plantations, or large beds of osiers, might be very advantageously grown in almost any soil, such as banks of rivers, etc., and, annually cut, would produce a sum of money that I have no doubt would largely remunerate the grower. And from land that cannot otherwise be made available for tillage, notwithstanding the vicissitudes of seasons, taking good and bad under view, the writer has experimentally ascertained that an acre of willows or osiers will often bring the grower a larger sum of money than an acre of wheat; and likewise from land that would be almost useless for other crops.

As regards the nature of soil and subsoil suitable for growing them to the best perfection, osiers delight in banks of rivers or drained swamps, and are greatly invigorated by occasional floods or irrigations. Plantations

of them may also be formed, and will succeed well on low, spongy bottoms along the margins of streams.

In the great majority of farms will be found level, marshy, wet spots, which, by drainage, cannot well be made available for tillage, which might be planted with the willow, and would afterward recompense the proprietor or farmer in a two-fold way. The land might be prepared in various ways for this crop, owing to the extent and nature of the soil. For plantations of any considerable extent for osiers, the ground should be formed, by the spade, into beds of from eight to nine feet broad, with intervening furrows or narrow ditches to carry off the water. The plantation may be made at any time between the fall of the leaf and an advanced period in spring; but the last two weeks of February and the first weeks of March, in England, April and the middle of May, in America, are the most proper times for planting the willows. Cuttings fifteen inches loug should be taken with a knife on an upward slope from well ripened wood of either two or three years' growth. They grow more luxuriantly when planted about two-thirds of their length in the ground, than when they are less deeply planted.

Osiers succeed best in a deep, moist, free soil; ground dug to the depth of twenty-four inches, with a small quantity of dung and old lime rubbish put in the bottom of the trench.

The willow, for the use of the basket maker, should be cut every year, slopingly, with the knife, within three buds of the point whence the shoot issued, and will admit of being cut back once in three years for the use of the cooper, exactly to the swell of the shoot of the three years' growth—thus compressing the plant back to its ancient dwarf form, at the same time realizing a handsome return.

Moreover, by treating osiers in this way, they will last and produce well for a great many years. The ground should be deeply stirred with the hoe, and kept clear of weeds; but digging with a spade around the roots of willows often proves very hurtful to the fibrous feeders, as we often meet with a great portion of such oozing and growing very near the surface of the soil.

The way in which willows are most commonly disposed of, after being cut, is, they are sorted into trusses and tied into bundles of two and sometimes three feet in circumference; and if intended to be stripped of their bark they are set on the thick end, and immersed a few inches in standing water.

They succeed best in northern exposures, provided they are not overtopped. Should the ground be at all suitable for the crop, each set will produce the first year two good basket rods, or 24,000. The second year, the sets being much stronger, will produce on an average six rods, one more or less being considered a very common number, one of which may be left on each stock for hoops, and the remaining 60,000 cut for baskets, which would be worth about $120.

Location for a Catawba Vineyard.

Mr. L. C. Stephens, of New Hartford, Connecticut, wants to know where to locate a vineyard of Catawba grapes. He says:

"I wish to buy a farm for the purpose of growing grapes and fine fruit, and as near New York as consistent, but I am uninstructed as to the localities where the Catawba will ripen with general certainty, and that is one of the kinds I wish to cultivate. I should have the greatest confidence in your opinion. Please state if the vicinity of Milford, Conn., or Darien, Conn., on the shore, or New Rochelle, will answer for the purpose. Is Plainfield, N. J., suitable? I see farms for sale in those sections. I am getting young vines in readiness for grape growing—say the Delaware, Hartford Prolific, Catawba, Isabella and Concord. Should like you to name kinds that you would recommend."

Mr. Solon Robinson.—I cannot recommend any of the localities named for the Catawba, "where it will ripen with a general certainty," though it will do so occasionally in all of them; but that kind of uncertainty will never answer for a man who depends upon the fruit of vines as a crop. I have said to my correspondent that Delaware, Concord and Hartford Prolific will flourish in the localities named, and in favorable situations the Isabella, but that is not to be relied upon under all circumstances. I have also said to him that plenty of good vineyard land can be bought, within an hour of this city, at $100 an acre, and that a man can do well growing grapes, if he understands it, either to sell the fruit or to make it into wine. As this is an important question, I ask opinions of other members of the Club.

Prof. Mapes.—I have given great attention to location in many sections of New Jersey, especially in the south part, where land can be bought at from $5 to $15 an acre, within two hours of New York or Philadelphia. This land has remained unoccupied because it has been held out of market by large proprietors, until very lately, and has been thought to be unfertile because of its sandy appearance on the surface. Now it is found that there is clay enough to make a very productive and an easily worked soil, which will produce grapes or anything else.

Mr. Wm. S. Carpenter.—The remarks of Prof. Mapes probably might induce Mr. Stephens to locate on the cheap lands of New Jersey. As I understand the letter, the gentleman wishes to locate in Connecticut or Westchester county. A number of varieties of grapes can be grown in these places. It is necessary that the soil should be well drained, either naturally or artificially. The Concord and Hartford Prolific are grapes that will make excellent wine, and will return a good profit from the outlay. Brandy has been made from the Concord that has been sold for eight dollars per gallon. I would not recommend either the Isabella or Catawba. The Delaware is a good grape, and one that gives general satisfaction; but it will cost a large amount to set out a vineyard.

Mr. A. L. Smith said that he had grown Catawba and Isabella for twenty years, and neither ripens oftener than once in three years, and he intends to abandon them for Concord, Hartford Prolific, Delaware and Clinton. With these varieties, the gentleman can succeed in any of the places named, but not with Catawba.

Prof. Mapes said that there are but few varieties of grapes in this or any other country that will make first rate wine, and some good wine grapes will not make good brandy. This is the case with the Madeira wine

grapes. The best brandy comes from an inferior wine; but as yet, although our American wines are inferior enough, we have never succeeded in making good brandy. The Catawba grape will not make good brandy.

Mr. Doughty, of New Jersey, said that those who have Concord vines must understand that they will not bear manuring like the Delaware, because they grow so rank and make so much wood.

Prof. Mapes.—The Concord grape was preferred last season by our Broadway fruiterers. One of them told me he paid fifteen cents per pound for the Concord, while he purchased the Isabella for ten cents.

Peach Borers.

The Chairman inquired what he should do with the worms in the peach trees.

Dr. Trimble.—Dig them out and destroy them.

Prof. Mapes.—That is too tedious, and entirely unnecessary, when they can be killed so much easier with hot water poured from a tea-kettle spout upon the bark where the holes are, which cooks the worms and never injures the trees.

Mr. A. L. Smith thought it very difficult to reach all the worms with hot water, though he had never tried it, because he adopted a plan to keep them out. He mixes fine muck and wood ashes into a mortar, and builds a small mound, six to twelve inches high, around each tree, to remain during the time when the eggs would be deposited, and in this way he has kept his trees healthy for twenty years, using no manure but buckwheat chaff and straw, which insects do not like to harbor in, and he gets a good crop of fruit every year, and finds his ten acres of peach orchard the most profitable upon his farm.

Mr. Carpenter.—Sulphur is recommended as a remedy. A handful of sulphur is placed round the collar of the tree, and has given great results.

Gas Lime.

Mr. Van Antwerp.—What is the advantage of using gas lime as a manure for top dressing grass land?

Prof. Mapes.—If the land required plaster there might be some advantage from its use, but from my experience I find it requires ten years to thoroughly change its character.

Mr. Carpenter.—Will Prof. Mapes inform us of the effects of Peruvian guano upon our land?

Prof. Mapes.—If Peruvian guano is treated with sulphuric acid, changing the carbonate of ammonia into sulphate, you will find great advantages from its use. Peruvian guano, if imperfectly applied, will impoverish the soil; while if properly applied, it will be of advantage to the crop.

"The Preparation of Hotbeds" was adopted for discussion at the next meeting.

Adjourned. JOHN W. CHAMBERS, *Secretary.*

February 17, 1863.

Mr. Edward Doughty, of New Jersey, in the chair.

Winter Pears.

Mr. Leffingwell exhibited the Columbia Virgalieu in good preservation. These pears were from the original tree on the Fox farm, West Farms, N. Y.

Mr. Bergen exhibited the Easter Beurre and the Crassane; the latter is not conceded a good pear, but as it is a good keeper, excellent for cooking, and sells well in market, he considers it a very profitable one to grow. The best winter pear that he knows of, is one with that long, unpronounceable French name, the Doyenné d'Hiver Nouveau, the synonym of which is Doyenné d'Alençon.

Apples.

Mr. Carpenter exhibited a variety of apples; among them were the Baldwin and Roxbury Russet. The latter apple, he thinks, cannot be advantageously grown with us.

Mr. A. L. Smith.—In my section this variety does well upon strongly manured lands. I apply two loads to a tree. The well-manured fruit will keep as well as potatoes, if put up in air-tight barrels. The Rhode Island Greening is very uncertain. The fruit fails to ripen perfectly, and keeps badly. The Baldwin apple does well upon dry, rich soil. I have five-year old trees that yielded five barrels, by forcing the growth by plowing and manure upon the hoed crops. We consider the Baldwin one of the best apples in our section of country, and it is very profitable. I have an orchard of seven acres. The last season I picked five barrels off some of the trees, which are now eleven years old. Joseph Wellington, West Cambridge, Mass., has an orchard of thirty acres of Baldwin apples, which he values at $30,000. This orchard had produced an income of $3,000 a year. In Connecticut there is an orchard, where the owner keeps hogs in it, that produces good Greenings, but they do not keep as well as Baldwins. I would sooner have a crop of Baldwins every other year than a crop of Rhode Island Greenings every year. The trees of the Rhode Island Greenings are infected by a worm, that does the orchardist great injury.

Mr. Fuller.—Then it is not the quality of the apple you object to, but the worm that infects the trees.

Mr. Carpenter.—Our friend, Dr. Trimble, some weeks since presented a very superior apple, which he understood as originating in New Jersey. I was very much pleased with this apple, and as Dr. Trimble promised to distribute grafts of this tree, I was in hopes of adding this variety to my orchard; but since that time I have ascertained the history of the apple. The original tree stands in the garden of Mr. Stephen P. Carpenter, of New Rochelle. It has been called the Ferris apple, but is better known as the Westchester Seek-no-further.

Dr. Trimble.—From all the information I can get, it appears that the apple originated in Albion, Orleans county, N. Y. I think our friend, Mr. Carpenter, is mistaken in the location of this apple.

Mr. John G. Bergen stated that a gentleman put up two barrels of apples,

one in a flour barrel, which kept poorly; the other barrel, which had contained lime, kept entirely sound. The apples looked as if only just picked from the tree, and the flavor uninjured.

Mr. A. L. Smith.—I have tried apples packed in lime to my satisfaction. I shall not try it again; they kept well, but the flavor was destroyed; besides, it is very difficult to clean the apples from the lime, and then they decay very rapidly when exposed to the air.

Early Tomatoes.

Mr. J. Franklin Spaulding, Nashua, N. H., writes:

"I notice in the reports of the weekly meetings of the American Institute Farmers' Club, January 27, the Chairman says: 'The best way for a family to get early tomatoes is to grow the plants in a hotbed, and select the strongest, and set them in the most favorable situation.' An erroneous opinion prevails in regard to this subject, which it would, I think, be well to set right. Most people, excepting professional gardeners, suppose that the earlier you start plants the more forward they are at setting, and the earlier you get tomatoes. This belief is so prevalent that it is difficult to dispose of plants which are not nearly ready to bloom at setting time. This works to the gardener's advantage, as the first lot of plants are generally set early, and the late frost makes room for another set. In this vicinity plants should not, on the 25th of May, be more than five inches high, and the second week in April is early enough to sow your seed. That the practice of producing large plants is opposed to nature's laws, we will endeavor to show by reason. As a plant reaches maturity, the *growing power* develops into a *fruit-producing*, which was the principal object of the plant's growth. A sufficient volume of roots having grown for this purpose, their object is to furnish nourishment and strength to the plant. Disturb these roots by transplanting, and you take away the vital power of the plant, for they do not seem to possess, after a certain date, the power of reproducing root, except at the sacrifice of fruit. A young plant, on the other hand, readily revives, and soon gets over the check which it has received by transplanting."

Mr. John G. Bergen.—I was the chairman at that meeting. The gentleman must have misunderstood my remarks. I sow the seed in hotbeds in February and in April; when the plants are about three inches high they are transplanted to other beds not as hot, but where they can be protected. They are set in these beds four or five inches apart, where they grow stocky, with strong roots; and from these beds they are transferred to the field, after all danger of frost is over, with as much dirt as possible adhering. To make it adhere, the bed is drenched with water, and the plants taken up with a trowel or spade and set upright upon boards, and reset rapidly, and the growth hardly checked. When plants are taken direct from the hotbeds to the field, they have but very small roots, and their growth is seriously checked. We are careful to set the plants about the same depth they stood in the plant beds.

Dr. Trimble.—I take my plants from the hotbed and set them in pieces of reversed sod, and place them where they are sheltered, until ready to set in place, and thus I get well rooted plants, that are not checked in

growth when set in the garden. I have transferred plants in this way without injury when they were in blossom.

Mr. A. L. Smith gave his mode of growing tomatoes. He digs holes eighteen inches deep, and puts about six inches of rich earth at the bottom, in which he sets the plant, and, as it increases in size, gradually fills in till level, and after he has done hoeing puts three or four shovelsful of white sand around the plant, which he considers better than manure.

Mr. Carpenter.—I take the opposite course, endeavoring to keep everything well up with the surface.

Mr. J. G. Bergen—Sand might answer for manure in Connecticut—it would not do for Long Island, and we never should succeed if we set our plants, as Mr. Smith does, in holes. I live in a section of country where more tomatoes are raised than in all the adjacent counties. Some of our farmers plant from ten to twelve acres. We prepare the ground very mellow and rich, and mark it off four by five feet, and some five by six feet; and the vines, when fully grown, cover the ground that we can hardly get between them.

Mr. A. S. Fuller.—I plant my tomatoes in poor soil, and when I find about a dozen tomatoes set upon the plants I stop them, and then transfer them to the ground, and force them to ripen the tomatoes set. I want tomatoes very early, as I consider tomatoes grown the last of the season not fit to eat.

Delaware Grape Raisins.

Mr. R. G. Pardee stated that he had made some excellent raisins this year made from Delaware grapes. with no signs of decay in drying.

Subject for the next meeting: "Pruning, Grape Vines in particular, and Preparation of Hotbeds."

Adjourned. JOHN W. CHAMBERS, *Secretary.*

February 24, 1863.

Mr. Edward Doughty, of Newark, N. J., in the chair.

Wax Models of Fruit.

Mr. William S. Carpenter exhibited models for the purpose of letting members know what beautiful ones they can have if they wish. The specimens were made by Mrs. De Wolfe, corner of Broadway and Twenty-first street, New York. They were very much admired.

Pears and Plums.

Dr. S. J. Parker, Ithaca, N. Y., writes inquiring the name of a hardy plum and pear grown in that region. He says:

"It is about the size of the old blue plum, which perished years ago by curculio and black knot. The color is reddish blue on the sunny cheek, and greenish white on the shaded side, with a whitish blue bloom when ripe, and is then sweet, soft and pleasant to eat, or good for cooking. The

tree is a rapid grower, and when fifteen or twenty years old is subject to the black excrescence, which in ten years more kills the tree. Young trees are rarely affected. Somebody has said it is 'too tough to have the excrescence.'

"It is almost proof against the curculio. That is, while the curculio does me the favor to thin out one-third to one-half of the excessive crop which every year loads my trees, it does no injury to the rest, and I get a good supply of plums, which are either eaten up or sold every year. That same somebody has said 'the plum is too ugly to be bitten by the curculio;' but I consider that a great slander, probably a spiteful grudge, owing to the origin of the tree, which was, that an old skinflint of a tree seller, when I was a very young boy, sold them about town here for five or ten cents each; and grow they would, and would not die anyhow. Indeed, they were about as persistent in growing and resisting the curculio and excrescence as the old codger was in selling a lot of them 'for a dollar,' whether anybody wanted to buy them or not. I say, all this is a slander on the tree—a willful libel, in fact; for in scarce years I always have plums to eat and sell, even though I have stuck the cheap trees in the toughest ground I have got, where they stand all sorts of neglect and abuse without a murmuring word. That all this is a 'wicked shame,' is evident from the fact that nearly every year, from ten to fifty miles distant, these plums are sent for, as a necessary part of the year's supply of preserves.

"I have forgotten to say, some years it is so much whitened by the light blue bloom as to be considered a blue, not white plum.

"Its greatest fault as a tree is that, as you in the Club say of wheat and sugar cane, it 'tillers' off a lot of young trees every year at the root; so that the person I bought them of has trees to sell every year. Owing to this tendency, which we careful farmers out west here haven't time to nip in the bud, which is a nice way to treat weeds and other articles on a farm, I have a few trees to give away every year to anybody who wants to try the thing.

"Somehow, in the last dozen or more years, this 'pesky plum' has given us most of our plums, and we have sold more than of all others. May be it is a good tree, after all, as its account book foots up well.

"The other fruit I want to ask the Club about is a pear tree that was thrown in with a lot of trees by the old tree-seller, to 'make up the dollar's worth.'

"This tree, too, is as tough as a pine knot. There is no die to it, that I know of; never anything the matter with it; takes care of itself; never bothers anybody; bears nearly every year, and always a full crop. You can't flatter it by any of your attention with manure, nor compliment it by spading. Forking up the ground, and killing the grass about it, it treats with perfect contempt, as useless modern humbugs. The only thing that the tree seems really grateful for is to be let alone; though, once in a ten years' time, breaking off a foot or two of the ends of the branches seems to be agreeable to it.

"It is not a very large pear. Resembles somewhat the Seckel and Washington, as figured in the third volume of Agriculture, of the Natural History of New York, State Reports. It has the peculiarity that, until a

week or ten days before they ought to be picked, no wind will blow them off, nor will they be shaken off. Suddenly they begin to fall, and in a day or two will all be lying on the ground, about the toughest green things you ever saw, apparently 'fit only for the hogs,' and doubtful whether *they* would eat them. But pick them up and lay them away, the five or ten bushels from each tree, and in about twenty days they are yellow, thin-skinned, juicy, sweet—melting in your mouth.

"Talk about pear trees hurting themselves by overbearing; why, this tree would spit ten bushels at you, and not feel it a bit. It will load every inch with fruit, and then the next year load itself again, just for the fun of it, in the same manner. If it was not such a stupid pear tree, I would think it was saying: 'We old revolutionary first settlers ain't your puny dwarfs that want pampering all the while, and then are too lazy to do anything. We knew a thing or two a hundred years ago, I can tell you. We learned how to grow when we had to stand it, I tell you.'

"Another pear tree I have, has this feature: it is a tall standard, thirty or forty feet high, and as many years old. I have tried all sorts of ways to ripen the fruit, but ripen it will not. Being a fall pear, it rots before it ripens. But all this is more than compensated by its hanging long on the tree, and by its one use. Pick them, wash them clean, put them on a clean tin baking plate, put them in the oven, and let them cook slowly until baked brown—nice and tender—and you have a luxury that makes every visitor say: 'I'll take another of those baked pears, if you please; your wife seems to know how to bake pears remarkably well.' 'My dear madam, how do you bake them so nicely? Do you put sugar on or in them?' 'O, no! They are only baked. We have to bake the pears of this tree to get rid of them.' 'Should not think you'd have any trouble on that score, if all are as good as these.' 'Yes, we all like them when baked.'

"This pear is large, tough, not knotty, but fleshy, juicy and flavorless, do what you will, until baked, when its obstinacy and ill-temper are all gone, and it is mild, sweet, fine flavored, and often inquired for, hot or cold.

"These three fruits I have repeatedly shown to good judges, but none have been able to name them."

Mr. Wm. S. Carpenter.—From the description given by Dr. Parker, I am unable to name the pears; the plum, I should think was a damson. I hope Dr. Parker will send us some of the pears and plums next season.

Mr. Solon Robinson read a very interesting letter from Mr. D. Petit, Salem, N. J :

"KEEPING APPLES IN LINEN.

"There is one mode of preserving apples which has been practiced here for many years, and which I have tried with complete success, viz.: Place them on the floor in a room, or in any other cold situation, early in the winter, and cover them well with some kind of linen, and leave them so through the various changes of winter. I have known them to come out in the spring rather improved than otherwise. I give facts only.

"THE BAROMETER.

"About two months ago I gave you my experience on the movements of the barometer, as an indicator of the weather. Let me now cite your

attention to two remarkable changes in the weather, and as indicated by the barometer since that time, not according to the learned, but the rules I send, viz.: On the 4th inst., the barometer rose in the evening to 30.95 inches, the highest I have ever seen it. While at that point the air became cloudy—indicating a humid atmosphere—and consequently stormy and wet weather, because the barometer had nearly an inch to fall to reach 30, and with the rapidity of the fall would be the increase of the storm. On the 5th, at sunrise, thermometer 7 degrees, barometer 30.90, and by nine o'clock barometer 30 87, wind east, and snow storm commenced. It continued through the day, and was succeeded by a rain storm through the night, wind hard from southward. Next morning, thermometer 47 degrees, a change of 40 degrees, and barometer 30 inches, a change of nine-tenths of an inch.

"The other change commenced on the 19th instant; barometer 30.87, and somewhat cloudy. On the 20th, 30.85, wind northeast, cloudy, air humid, storm threatening. On the 21st the storm followed, which has been reported as defeating the plans of General Burnside at Fredericksburg. According to the rules laid down by the learned, we should have had fair weather during the time of those storms, as the mercury did not fall below the point marked *fair* on the barometer. The latter storm was indicated by the barometer nearly two days before it commenced; and had Burnside used a barometer, and known its true indications, he would not have attempted such plans.

"SORGHUM SYRUP.

"Last year I made above 3,300 gallons of good thick syrup, from the juice of the Chinese sugar cane, but have not succeeded yet in graining it sufficiently to make our own sugar. We think the syrup much superior to New Orleans molasses. It is of a lighter color and more like honey. I used Cook's evaporators, but, as you live further north, a more detailed account may not interest you. The African cane will come to maturity as easily with you as the Chinese will with us; and, judging from experiments made with both, I believe where they will ripen their seed they will be among our most profitable crops.

"COTTON IN NEW JERSEY.

"Late last spring I planted a small lot of cotton seed received from the Patent Office. The result was 160 pounds good ginned cotton to the acre. Many of the bolls did not open as they would have done if I had planted early. The green bolls I pulled off, and, after drying them some, took the cotton out. The superintendent of the Gloucester cotton factories, to whom I presented a sample, pronounced the staple good and strong. It was then worth seventy cents, but is worth more now. At the present price of cotton it must be one of the most remunerating crops in this latitude. I intend to plant largely if I can procure seed.

"JUTE.

"I planted last spring a small lot of seed of the jute plant—a species of the chorchorus—from the fiber of which the gunny-bags are made; but the plant comes up too weakly to succeed well where there is foul seed in the land. Mine was a partial failure, but I saved some seed to try again.

"WHEAT KILLED BY CORN SHOOKS.

"I sowed wheat one year among my corn; and late in the season for cutting up corn, I cut up that and stacked it on the wheat eight hills apart each way, thinking as the stacks were small the wheat would live under them; but every stool of wheat died where the stacks stood, although the air could pass through or between the stalks, and the sun shine in or under them in many places. This fact has led to the reflection:

"VEGETATION REQUIRES THE DIRECT RAYS OF THE SUN.

"How far can vegetation succeed where there is a total absence of the direct rays of the sun? I can say I know of not a single instance where there has been a healthy plant produced, of any considerable size, nor of a sickly one either, tree or plant, to arrive at a state of maturity in the absence of the light from the direct rays of the sun. If this view is correct—is founded on a law of nature, which is unchangeable—what becomes of the theory of the learned Hugh Miller, in his "Testimony of the Rocks," where, after describing the first and second days of creation, dividing them into periods of many thousand years, he speaks of the third day as a day of extraordinary flora—a day corresponding to the carboniferous period which formed our coal beds—ere the sun first broke through the clouds (which had through all previous time of creation hung as a thick mantle around the globe), and shone on sea and land? Then, after describing the other days of creation, he adds: 'I know of not a single scientific truth that militates against even the minutest or least prominent of its details.'"

Keeping of Winter Pears.

Mr. Wm. S. Carpenter.—I have brought to-day a number of varieties of pears, to show the perfection in which they have been kept. The Vicar of Winkfield is as green as when they were picked, and I think will keep until May.

Mr. John G. Bergen.—I wish Mr. Carpenter would inform the Club how he keeps them in this state; mine have been ripe some time.

Mr. Wm. S. Carpenter.—My method is to let the fruit hang on the tree as long as possible, and then carefully pick and carry in baskets to the barn, and take out the fruit by hand and lay it upon straw on the floor without bruising. The pile may be one to two feet deep, and is to be covered with straw, to exclude light, and the room should be a dark one. Keep the fruit here as long as possible without freezing, and then, on a cold, dry day, pack the pears in barrels with oats in the chaff, and put them away in a dry cellar, as cool as it will be safe.

Mr. Steele.—There is something in the flavor of these pears that I do not like; they have imbibed a slight musty taste from the material used for packing them. I have placed pears in the center of barrels of potatoes, and found them in good order when the barrels were opened late in the season, and free from any unpleasant taste.

Mr. Pardee.—The remarks of Mr. Steele are very pertinent at this time. I have known pears packed in the center of barrels of hard apples, and they kept well.

Mr. Geo. H. Hite.—I obviate this by using cheap soft straw paper, and

changing it when the wrappers get moist. It is true that this makes a great deal of labor, wrapping and unwrapping each pear, but I think myself well paid for the trouble.

Mr. R. G. Pardee said that whether anything was used or not for packing fruit, it would not retain its odor and flavor in some cellars. There is something in the condition of the soil or air that extracts the most valuable qualities of the finest fruit. It is also often injured by being packed in unsweet barrels. Pears may be advantageously mixed with high flavored apples, some of which impart a delicious odor to the pears when packed together. With bad packing, the most odorous apples lose much of their value. In a musty cask, the Spitzbergen apple will acquire a tainted odor that is disagreeable.

Mr. Wm. S. Carpenter.—I tried packing in oat chaff as an experiment. I have also used nice sweet hay, cut fine, which is an excellent plan; but I am satisfied that rice hulls, where they can be obtained, would be preferable to any other material.

Mr. Solon Robinson.—The most important matter in preserving fruit is to see that it undergoes the natural sweating process before it is finally packed for winter. I think this is one of the principal reasons of Mr. Carpenter's success. He piles his fruit on straw and covers it with straw, and there it parts with its moisture before it is packed in the barrels. If nothing was put with it, it would probably keep just as well, if the room was sufficiently cool.

Mr. Steele.—I was not in the room when the letter relating to the plum was read. I understood there was something said in relation to the cur culio; some years since my plum trees were very much affected by this insect. I found by using the whale oil soap, diluted in water, that I saved all my plums. I used a syringe, and applied this liquid four or five times during the season, after the plums were set.

Mr. Carpenter.—Fruit is very apt to taste musty if placed in old cellars, or put into old barrels.

Mr. Pardee.—I think the cellar should be dry and well ventilated.

Monmouth Pippin.

Mr. Steele exhibited a new apple called the Monmouth Pippin. This apple originated in Monmouth county, N. J. It was pronounced a good apple, and well worthy of cultivation.

The subject of the day, "Pruning—Management of Grape Vines," was called up

Mr. A. S. Fuller.—The importance of this subject of pruning has never been, nor do I think ever will be, over-estimated. The difference between the properly cultivated and pruned plant, and the one that is not, is as great as between the man who is entirely without education and the one who is thoroughly enlightened. The first is the wild savage of the forest—the latter the master of arts and sciences.

The cultivated vine must be pruned and properly trained, or the best results will not be obtained, and often total failures will follow, as well from the half pruning as the no pruning system. With cultivated fruits we should not try to follow nature, but to improve it; and there is not a

created thing, either in the animal or vegetable kingdom, that is not susceptible of improvement. This is the reason why we hold that the cultivated vine should be closely pruned. The experience of three thousand years proves that the best results are produced by pruning, and its neglect has caused more failures than all other causes combined.

So much importance was attached to this branch of fruit culture, in olden times, that wine made from unpruned vines was forbidden to be used at the sacred feasts. When the old French monarch wished to strike a death blow to the cultivation of the vine, he forbade the people to prune. One might readily imagine that a king had issued his royal decree against pruning and trimming in this country, if we were to judge by the appearance of many of the wild-growing vines that meet our eyes in every city yard, and many times in vineyards, where we should look for better things.

When we learn the necessity of pruning, and act accordingly, we shall have made one great and sure step towards success in grape growing. One serious impediment to grape culture in this country has been that we had but few good native varieties; but, thanks to the spirit of improvement, this has been in a great measure removed, and the main thing for us now to learn is, how to prune and train these new and valuable varieties. I will not pretend to describe the best system; there are many good ones that we can modify and adapt to our native varieties. It is said that in Europe every district has a system peculiar to itself. Here every vineyard has one of its own or none. Scarcely any vineyard is pruned two seasons alike, for the vineyardist, not being satisfied with a good crop, is, like poor Oliver, crying for more. Each season he prunes so as to have a little more fruit than the preceding one, until his vines are so weakened by excessive bearing, that mildew, rot and general debility step in and relieve him of further trouble.

What is true of the vine is also true with other fruits and flowering plants, although the necessity may not be quite so imperative; for there is no annual, biennial or perennial in cultivation that may not be improved by judicious pruning. There is no successful cultivator of the rose, dahlia, crysanthemum or carnation that does not prune his plants. So it is with the orchardist—he prunes his trees annually. We may talk of fancy and concentrated manures, or of good old homely barn-yard manures for the vine, but with them we can only lay the foundation. We need a plain and judicious system of training, strictly followed to complete the structure.

Our great error is in not pruning enough, and a majority of persons will begin at the wrong end and prune so as to make the vine grow tall instead of low, and the only reason we ever heard advanced for doing so was that the best fruit always grows at the top of the vine, and therefore they let the vine grow tall, and bear its fruit at a high elevation. The advocates of high trellises point to the wild vine with its fruit 100 feet from the earth. This only proves that the fruit of the vine is generally better and more abundant at the top than at the base, but if that top is but four feet from the earth, the fruit will be better than if it were forty; and here is the foundation of all the successful systems of training—keep the vines so low that they may be within control, and so prune that the fruit will be produced at the top of the vines, and always within reach of a man's hand.

The vine which Mr. Fuller exhibited to illustrate this low top, is best represented by a ten-tined manure fork, of anything we can refer a farmer to. The handle of the fork representing the single trunk may be from one to three feet high, and the two arms, turning off at right angles, support the canes, represented by the tines of the fork. These arms should be three to five feet long, and support three to five canes upon each, which are trained to grow eight to twelve inches apart, and not over three or four feet long.

These canes bear the fruit close down to the arms, three to five bunches each, and are cut away every winter, and new ones grown, alternating every year, so as always to have one bearing and one wood-producing cane. Mr. Fuller would plant a vineyard in rows six feet apart and eight feet between vines, which would give 905 vines to an acre; and these trained upon the single arm system, upon trellises only four feet high, will be capable of producing twenty pounds of grapes per vine, but allowing an average of only ten pounds, it will give 9,050 pounds per acre. If the vines are trained upon the double arm system, on higher trellises, though in rows further apart, there would be twenty canes to each vine; and if each cane produces three bunches, averaging only two-thirds of a pound each, it would make forty pounds per vine, and make 36,200 pounds per acre, which it is possible to produce upon a well trained vineyard.

Mr. Fuller does not think it worth while to cultivate vines upon the double arm system, except upon very high priced land, because it is more expensive to build high trellises, and more expensive to manage the vines. It is very important to keep the vines evenly balanced, with just as much wood upon one arm as upon the other, and to keep each cane summer pruned, so that one is never allowed to outgrow its fellow. The old stump and arms go on increasing in size, but the bearing wood is constantly renewed, and never gets up any further from the ground. Let it be remembered that a vine always produces its fruit upon the topmost branches, but that it is just as easy to keep that top within four feet of the root as at a hundred feet. Mr. Fuller said that he had planted a vineyard of five acres, at first with Delaware, Diana and Hartford Prolific, but of late Concord only. His trellises are four feet high, with a wooden bar at the bottom and wires above, and all the vines are trained to spread their arms four feet each way.

On motion, the same subject was continued for the next meeting.

Adjourned. JOHN W. CHAMBERS, *Secretary.*

March 3, 1863.

Mr. J. P. Veeder, Guilderland, N. Y., in the chair.

Apatite Rock vs. Bones.

Mr. Eli H. Cope, Westchester, Pa., asks in relation to the apatite rock, of Sussex county, N. J. He is a grinder of bones, and as they are growing scarce and dear, he would like to substitute the mineral phosphate.

Prof. Mapes.—The owner of the quarry is Mrs. Stuart, who charges fifty cents per ton for the privilege of quarrying it. For agriculturol purposes it is worthless, notwithstanding analysis gives it the same quantity of phosphate as bones. It has been thoroughly tried in England and discarded.

The Potato Disease.

Mr. Martin Metcalf, of Battle Creek, Mich., writes that his father thinks that he has certainly discovered the cause and cure of the potato rot, and wants to know if there is still a prize offered.

Mr. Solon Robinson.—I have written to Mr. Metcalf that if he could satisfy the public that he had discovered a sure remedy for this disease, the prize of $10,000 was sure; and he wants to know if the Club would endorse this assertion. This was fully agreed to.

Growing Tobacco.

Mr. Joseph McCoy, of Spring Mountain, Ohio, writes for information about growing tobacco.

Prof. Mapes.—I raised tobacco last year. Its cultivation is similar to the cabbage. From an experiment made upon my farm last year by Mr. Quinn, he believes that 1,400 pounds per acre can be produced. It grew upon a heavy soil, five feet high to the flower head, and some of the leaves were ten inches wide, and were soft and silky, which gives value more than weight. To make tobacco valuable requires skill and experience in curing, as if well prepared it never sweats and mildews in store. Firing destroys the value of the tobacco. The stalks are tied together and hung over a wire, so that the leaves get nourishment from the stem, which gives flavor to the leaf. In a damp day the leaves can be removed without breaking; they should be put into a heap and allowed to sweat; a cloth dipped in water and wrung out should be spread over the tobacco, and a dry cloth placed over that to keep the air from it.

Sugar Beet Culture.

Mr. Hiram M. Spicer, of Edmiston Centre, Otsego county, N. Y., wants information about the culture of sugar beets.

Prof. Mapes.—There are so many articles from which sugar can be made that are superior to the beet, I should recommend him to grow the Sorghum. If any one desires to grow sugar beet he can get pure French seed of the large seedsmen of this city, and by pursuing the same course that he should with carrots, he will succeed. The great requisite to success is deep tilth, upon a well drained, rich soil.

The Secretary.—By the proceedings of the Illinois Board of Agriculture, it appears that the farmers of that State use the juice of the Imphee for making sugar.

Improved Stanchions for Fastening Cattle.

Mr. S. E. Southworth, of Jamestown, Chautauqua county, has made a great improvement in the mode of building stanchions to fasten cattle. They are hinged at the top, so as to have a motion at the bottom of about

eighteen inches forward, which enables the animal to get up easily; and also a motion sidewise of several inches, giving almost as much freedom to a bullock's head as it would have if tied by a rope.

Australian Wheat.

Mr. Henry Steele presented some specimens of Australian wheat, brought by him from the great Exhibition in London.

Winter Barley.

Mr. Wm. S. Carpenter.—I sowed a winter variety of barley last year. This variety produces a very large, long head, and yields abundantly—from forty to fifty bushels per acre. I think this barley will be very advantageous to our farmers to raise.

Mr. John G. Bergen said that the greatest fault with Mediterranean wheat upon Long Island is its weakness of straw, and that certainly is not owing to want of silex in the soil.

Prof. Mapes.—Having an abundance of sand in the soil will not supply the necessary soluble silicates, as all soils contain several hundred times more silicates than are necessary. If Mr. Bergen would treat his soil with a supply of unleached wood ashes, he will find his wheat stand up.

The Price of Apples and Pears.

Mr. Carpenter stated that the King of Tompkins County apples are worth $3.50 a barrel; and he was offered to-day $40 a barrel, or twelve and a half cents a piece, for Glout Morceau pears.

Mr. Robinson suggested that they had probably cost him that to produce, counting all the expense of nine years to bring them into bearing, and all the failures.

Mr. Fuller said that not more than one barrel of three that the trees of this variety produced are fit for market, and probably not more than one in forty can be preserved by ordinary cultivators to a period when they will bring $40 a barrel; and if Mr. Carpenter has only got one barrel in nine years from all his trees, the crop, even at the priced named, is not a very profitable one.

Mr. Carpenter contended that the pears were nearly all clear gain, as the ground had been cultivated all the time in profitable crops.

Prof. Mapes insisted that land at $500 an acre could be profitably used to grow pears.

Mr. John G. Bergen thought ten will fail where one succeeds in making pear growing profitable upon any land.

Mr. Fuller said that he had rather grow grapes at five cents a pound, and he would not recommend the Glout Morceau as a profitable pear to grow.

Prof. Mapes.—If I were planting only six varieties, I would not include Glout Morceau; and I do not know that I would in twelve sorts, but I certainly would in twenty.

Mr. Porter, whose pump I spoke about a few meetings since, is desirous the Club should appoint a committee to examine his pump.

The following were appointed the committee: Messrs. J. J. Mapes, John G. Bergen and J. V. Henry Nott.

Grape Pruning.

At the request of a number of persons who were not present last week, Mr. Fuller addressed the Club upon grape pruning, contending for the single arms and renewal system. He does not manure highly, because by only growing his canes two feet long the quantity of wood is so small that he does not need much manure. If convenient, he would mulch with long stable manure, but never put anything in a crude state near the roots of a vine. It is an object with European vine growers to produce as little wood as possible, and a large amount of fruit. We only want just leaves enough to ripen the fruit. If we grow many more we shall need to furnish food for no profitable purpose. Long vines require long and strong roots, and these must be fed in proportion. It is the greatest error that vine growers commit, to grow too much wood.

Mr. Robinson thought there was one greater error, and that was trying to grow too many varieties.

Mr. Fuller said, that is true, for out of one hundred sorts I can name but three that I can recommend as certainly valuable for everybody to grow. These are Concord, Hartford Prolific, and Delaware.

Prof. Mapes.—For years I have used the phosphates to manure my vines. Some years since I took all the trimmings from my vines and passed them through a straw cutter, placed them in a heap, sprinkled over with wood ashes, then well moistened with water, and covered with dirt. The next year this material was in such a state that I could apply it to my vines. I found that the vines manured in this way produced a large quantity of fruit.

Illinois Coffee.

Mr. A. H. Wetherill, of Hopeville, Iowa, thinks that the Club has condemned this coffee without giving it a trial.

Mr. Hoffman, who introduced the plant, in a letter to Mr. Wetherill last year, says:

"Two years ago last February I received a letter from my son in Australia, containing thirty seeds of coffee, whence was grown my little stock of seed. Directions: Plant on good ground, in drills, eighteen inches apart in the drill; the rows three and a half feet apart, the same as corn, one seed in a hill. When ripe, gather and thresh the same as beans. Plant and cultivate the same as corn. To prepare for use: Brown the same as other coffee: when ground, pour on boiling water, let it stand about five minutes and then pour off. Pour on more water, boil thirty to forty minutes, and it is ready to serve. Those who have prepared it in this way consider it as almost equal to store coffee. I have drank it prepared differently, and called it, as you do, 'poor stuff.'"

This coffee, as it is called, grows upon an annual plant or shrub, and will yield about thirty bushels an acre.

Mr. Robinson said that the sample sent him looked like shriveled peas.

Subject for discussion at the next meeting: "Strawberry and Raspberry Culture," and "Pruning Fruit Trees."

Adjourned. JOHN W. CHAMBERS, *Secretary.*

March 10, 1863.

Mr. N. Hawxhurst, of New Jersey, in the chair.

Lice on Cattle.

Prof. Mapes.—Can any member of the Club inform me whether they have tried any of the receipts floating round the country to destroy lice on cattle? Among them I found that oil placed on the coat of the animal was a remedy highly recommended, but I am under the impression that it would be likely to interfere with the healthy *endosmōse* and *exosmōse* functions of the skin. Every pore of the skin is an excretory organ, and if filled with any substance not readily removed, would injure the health of the animal. Another, the application of wood ashes. I am under the impression that the remedy is worse than the disease.

Dr. Trimble.—I have made insects a study. A number of insects breathe from their sides; the application of any oily substance prevents their breathing, so they die. I remember once, when practicing as a young physician, being called on to prescribe to a child who had been playing on some fleeces of wool. A tick from the wool had got into the child's ear, and caused great pain. I introduced some sweet oil into the ear, and in a little time the tick came to the surface, and was removed with a pair of forceps.

How to Produce Opium.

A lady in the north part of Vermont writes:

"I want to enter into the business of raising opium, but do not know how or where to get the seed to raise the poppies, and should like to see the manner of its cultivation, etc., discussed by the Farmers' Club."

Prof. Mapes.—Growing poppies for opium has, as a general thing, proved a failure in this country, either owing to frequent rains, which interfere with the production, or else because the plant does not afford opium enough to make it a paying crop. Some persons, however, have made a good business of saving the juice of lettuce, which is used by druggists as a substitute for opium. It possesses soporific qualities, without the narcotic qualities of poppies. The stalks are allowed to run up, but are cut off before seeding, and the juice gathers and dries in a wafer on the top, and is gathered twice a day, making a fresh cut every time. To make it profitable, the work must be done by children, and will then pay better than poppies.

Cotton in Kansas.

Mr. Wm. Hosford writes from Oskaloosa as follows, in regard to cotton growing in that State:

"I obtained a little seed from fugitives from southern Missouri, and by the Hon. S. C. Pomroy, from Washington, and planted it the 10th of May, in drills three and a half feet apart. The yield was 343 pounds in the seed, weighed when well dried. In Tennessee 800 pounds per acre is a crop. My seed was mostly the green variety. Some black seeds produced plants ten inches higher, with longer bolls, but did not ripen as early by three weeks. Some of my planting was on low, moist, rich land, that did

not want for rain, and averaged three bolls to the branch, and ripened more bolls in good season than the remainder that was planted on dry, poorer soil, which was hindered at least three weeks in growth for want of rain, and equally as much in ripening. I did not pick it until after all crops ought to be harvested. Our fierce Kansas winds did not injure it in the least. A machine for ginning all cotton for domestic use is easily made of two cylinders, sixteen inches in length, five-eighths of an inch in diameter, with rakers two inches in diameter, each driven with a power cylinder seventeen inches in diameter, with crank. That will separate one pound of clean fiber from the seed per hour. From my own experiment, as well as a great many others equally encouraging, I have arrived at the conclusion that if Kansas does not produce cotton next season sufficient for her own use, and the wants of at least two other States, it will be for want of seed; for I feel confident it could be easily done without materially lessening her other agricultural enterprise."

Prof. Mapes.—The mode of cultivating cotton practiced to a great extent at the South, is so different from the mode of cultivation at the North, that I will devote a few minutes in explaining the difference. The cotton at the South grows upon ridges, and after a time part of the ridge is cut down and leaves the plant growing upon small pyramids, but by the application of improved implements I am sure flat culture would produce a better crop.

Mr. John G. Bergen.—In visits I have made to the South it appeared to me that the mode of cultivation pursued was similar to our own, viz., flat culture.

The Oriental Sugar Root.

Mr. Isaac Martin writes from Marlborough, Chester county, Pa., for information about something advertised by one Wm. B. Marston, Utica, N. Y., as the "Oriental Sugar Root." Mr. Martin says:

"If one-half claimed for it be true, it deserves to be brought to the notice of the public. If it be nothing but a humbug, the confiding public should be apprised of the fact. Hoping that some of your members may be able to give a trustworthy account of the article, I shall be much pleased to see your opinions in the proceedings of your next meeting."

Prof. Mapes.—I suppose the root alluded to is the sugar beet, but as there are many plants from which sugar is made, such as the sorghum and imphee, farmers should be careful in purchasing seeds of roots with names only calculated to mislead.

Seeds by Mail.

Mr. Solon Robinson.—Are our farmers aware of the postage law which allows seeds, grafts, cuttings, &c., to be sent by mail at one cent per ounce? Congress, at its last session, reduced the price to half a cent per ounce, to take effect on the first day of June next.

How to Dissolve Bones.

Mr. C. C. Shaw, of Milford, N. H., writes to inquire how to dissolve bones.

Mr. Solon Robinson.—Break the bones as fine as possible with a hammer, and put them in five gallons of water, with one gallon of sulphuric acid. Handle the acid with care. A good thing to use it in is an old kettle, painted thickly on the inside with some earthy paint. A Scotch farmer gives his rule as follows: Add 340 pounds of sulphuric acid to 25 bushels of fine bones, and wet with 18 gallons of boiling water. Let it stand two days, and then mix the bones with two cart loads of fine mold, where they heat and become fine powder in the course of six or eight weeks. Bones will become fine if broken and mixed with ashes or fine mold, but they should be kept moist. I hope Prof. Mapes will give us his experience in this matter.

Prof. Mapes.—You will find it a very tedious business to break bones with a hammer, unless they are previously boiled in alkali to extract the oil and weaken the gelatine. Fresh bones cannot be ground fine in any mill, and although phosphate made from such bones would be more valuable, it would also be expensive, as the oil and gelatine protect them from the action of the acid, and require more to dissolve them, so that it is more economical to burn the bones before attempting to make them fine. If fresh bones are mixed with ashes, unbroken, and the heap covered with loam, and moistened, the bones will be so affected as to be easily made somewhat fine, and may be applied to land in that state. Burnt bones are not valuable unless treated with acid. When the bones are burnt and broken, put them in a hogshead lined with brick laid in clay, mortar at the bottom, and wet them with sulphuric acid, mixed one to ten with water, and occasionally draw off the water and add it to the compost heap, and apply more acid and water to wet the bones, and they will take up as much weight of acid as there is of bones, and make a valuable superphosphate. It will cost about $46 a ton to make, and will be cheap manure at that, where bones can be easily obtained. One ton of fresh bones, burned and treated with acid, will make half a ton of superphosphate; and 640 pounds will produce as good results, upon well prepared land, as eighty loads of manure. If land is underdrained, subsoiled and deeply plowed, it does not require nitrogenous manure. That will be absorbed from the atmosphere by the fresh, finely pulverized, deeply tilled soil; and the use of phosphate enables such soil to accumulate more nitrogen, which is utilized by the crops. All soils are benefited by adding potash. Of course, those best prepared are most benefited. It gives the silicate that is needed to give strength to all straw, and is a cheap manure at the usual commercial value of the cheapest kind of potash. It may be used in any quantity that a farmer can afford, and will pay a profit upon the cost.

Mr. John G. Bergen.—I always burn my bones upon a brush heap, enough to make them brittle, and then break moderately fine, and apply them in that way to the land.

Prof. Mapes.—That may do if the bones are only partially burnt, but it has been fully proved that perfectly calcined bones of the sugar refiner will never decompose in the soil unless acted upon by acid. I tried two tons upon an acre without benefit, and much larger doses proved valueless in Massachusetts. Unburnt bones will decompose and give up their phosphate to plants in time, though their decay is very slow; and if purchased,

the interest of their cost while lying idle would be nearly equal to the cost of converting them into soluble phosphate.

How to Manage Old Grape Vines.

Mr. Solon Robinson.—A lady residing at Castleton, Vt., wishes to know what course she shall pursue with an old grape vine. She says:

"I find a thrifty old vine here that has probably never seen a knife. It bears a very few good grapes—grows all over an old arbor. I would like to know how to treat it."

Mr. Andrew S. Fuller.—The only way is to make it over into a new vine, such as I have already described. I would cut away a mass of the old wood, saving some young, healthy shoots, and from these grow arms and canes upon the same system I have recommended for young vines. The only way to do with such an old vine is to remodel it and bring it into as good shape as possible, and then continue it upon the renewal system.

Poultry.

Mr. Wm. C. Perry, of Bedford, L. I., says:

"I keep twenty-five hens; about half of them pick the feathers off each other and eat them. I have had a fine Spanish rooster picked nearly clean. My hen house is thirteen feet long, six feet wide, seven feet high; hen yard, forty by eight feet. I feed them well, and give fresh meat every week. They are lively, healthy and lay well. How shall I stop this feather war?"

Dr. Trimble.—Supply them with a little bone dust.

Dr. Bliss.—If the gentleman would let his fowls out they would soon find what they wanted.

Prof. Mapes.—That is not what Mr. Perry wishes to do. He wants to supply something to the fowls when fastened up. I think if he gives them a supply of bone dust he will find it is the material they require. They should have a box of dry wood ashes to roll in, as they are often affected with lice, which causes them to be constantly picking each other.

Hardy Plants for Vermont.

Mr. Solon Robinson.—A lady correspondent wants to know if any of the Club know of a good place to get ornamental plants and seeds adapted to our high latitude—the middle of Vermont. Most of the plants we order do not live well through our cold winter, or do much in the short summer.

Mr. Fuller.—There are many shrubs that would be hardy there, I think—such as Wigelias, Japonicas, Lilacs, Syringas, part of the Spireas, and others. Peonias and Japan lilies are hardy, and tulips and several other bulbous plants. I will make a proposition to that lady. I will select 25 plants, which I think would be hardy at her place, and send them to her without charge, if she will cultivate them and report their progress two or three years to this Club. It will give us information as to what are hardy and what are not.

Grapes—What Kind to Grow.

Mr. A. A. Blumser, Burlington, Iowa.—I have noticed that the Delaware, Concord, Diana and Isabella were lately recommended as grape vines of established and successful character. Will you permit me to tell you that the Isabella in this part of the country seems to lose its habitat; although it ripens a few days earlier than the Catawba, the berries have a hard skin and pulp; its wine is deficient in aroma and alcohol, with an insipid, aqueous taste; it is more fit for culinary than any other use. The berries fall greatly when fully ripe, and sometimes bunches too. The best flavored grape here, producing the best wine, is the Catawba, which is in general cultivation in Southern Iowa; its grape is luscious, aromatic, rich in flavor, ripens well, and well repays the labor bestowed on it. Wine sold from $1.50 to $2.50 per gallon. All other kinds of grape vines are yet scarce, owing to the high price at which they are sold.

Mr. Bergen.—I am satisfied with the Isabella grape. The specimens of this grape, shown by Dr. Underhill at the Club last fall, were very fine. I distinctly understood from Dr. Underhill that he had made good wine without sugar from perfectly ripened Isabella grapes. The trouble is that it seldom ripens perfectly, except in very favorable situations.

Prof. Mapes thought that good wine could not be made from the Isabella without previously drying the grapes. The juice of Isabella grapes, as they are usually grown, bears but little resemblance to wine.

Mr. Carpenter.—I understood from Dr. Underhill that he was supplying both the Isabella and Catawba vines for cultivation on the Island of Madeira. It was very singular that these vines should be sent there if the fruit will not make wine.

Prof. Mapes said it was not the Isabella but the Catawba vines that were being sent to Madeira. A few Isabellas only had been sent for experiment. The Catawba vines that have fruited there give great promise of success. Grapes undergo a great change in transferring from one location to another. The grape that produces the Madeira wine is the same that produces Hock wine in Germany, and vines have been shifted back and forth to prove this.

Mr. Fuller.—The Concord is a very valuable grape.

"The Cultivation of the Strawberry" and "Pruning of Fruit Trees" was made the subject for discussion at the next meeting.

Adjourned. JOHN W. CHAMBERS, *Secretary.*

March 17, 1863.

Mr. Geo. H. Hite, of Morrisania, in the chair.

The Oat Aphis.

A farmer wishes to know the opinion of the Club in relation to the insect that destroyed the oat crop to such an extent in New Jersey last year, and whether it is likely to show itself again this year.

Dr. Trimble.—The insect that affected the oat crop last season was the

aphis or plant louse. · The same causes that brought this insect into being will produce it again. These insects have a number of enemies—the ichneumen and the lady bug destroy them. The hot sun and severe showers of rain will also destroy them. They make their appearance in places where they were never seen before, and they multiply with astonishing rapidity, and sometimes disappear very suddenly. Some men act as though their mission on earth was to war upon insects, and they are just as likely to kill their friends as enemies. They do not know that the natural food of the lady bug is just such insects as this oat aphis.

Wild Buckwheat.

Mr. C. Bridgeman, of St. Cloud, Minnesota, wants to know what to do with prairie land which has been cultivated a few years, and then becomes so infected with wild buckwheat as almost to destroy the crop. How can it be eradicated? What will the effect of clover be on such land? What is the best time to sow it, and how much seed per acre? Our soil and climate are better adapted to small grain than Indian corn, so we cannot hoe out this pest.

Mr. Robinson said he could not tell what Mr. Bridgeman means by wild buckwheat, without the botanical name, which should, if possible, be always given.

Dr. Trimble.—I presume it is a very common, tangling vine, which bears a seed exactly like buckwheat, which quails are very fond of, and live upon in winter where it abounds.

Prof. Mapes.—Nothing but clean culture, with some hoed crop, will rid the land of this and all other weeds. It always pays to keep land clean, if it is done by horsework instead of handwork, and the best implement for weedy ground is the one known as the carrot-weeder, which cuts up and combs out the weeds.

Mr. Solon Robinson.—The best time to sow clover is early in the spring, with small grain. If upon winter wheat, sow the clover on the last snow, at least four quarts to the acre.

Beans as a Farm Crop.

Mr. F. B. Redmond, of Niagara county, N. Y., wants to know what kind of beans to plant for the most profitable crop.

The pea been is said to be a great yielder, but ripens late and irregular, which is a serious objection.

Dr. Trimble.—I believe Lima beans are the most profitable kind grown, as they yield well, and bring a great price. The only objection is that they require poling.

Prof. Mapes.—The poles are not now so objectionable as formerly, because some of our most successful growers of Lima beans use poles only five feet high, and such are not costly nor liable to blow over. In early spring, place reversed sods in shallow boxes, cutting them in strips in two directions, and with a width of two inches each way, so as to form squares like those of a checker-board. Place these in a light cellar or other situation protected from frost. In each of these squares plant a Lima bean, eye down, with the small end lowest. After settled weather, when there will

be no danger of frost, take these to a well-prepared soil, and place four of them around each pole; these poles need not be more than five feet high above the ground. At the time of placing out the beans, they will probably be from one to five inches high, therefore ready to grow vigorously. The disturbance of the soil between the poles, which should be at least four feet apart in each direction, may be performed with a horse hoe, and this will be entirely sufficient to keep down weeds and to secure a proper tilth of the soil. When the beans are five feet and a half high, or as high as the poles, pinch off the terminal bud, and repeat this process should a new shoot start from the final leaf stalk. In consequence of this shortening-in, new shoots will be thrown out from the main stalk, and these will be well filled with beans, and so early in the season as to perfect their ripening before frost. As compared with the old system of permitting the vine to run to any length unchecked, this has many advantages. The main stalk becomes twice as large, the fruit-bearing shoots are all formed early, and the amount of crop is doubled. On the old system more than half the bean pods are developed too late to perfect themselves before frost. Lima beans require heavy fertilization, and even the most highly nitrogenous manures may be fearlessly applied in large quantities. Peruvian guano may be used with great profit for this crop. The advantage of this crop for growers far from a market, is in the ability to have a large value in a small bulk, for Lima beans are worth at all times, at the seaports, from fifteen to twenty-five dollars per barrel. The demand for both home consumption and export is always large.

Dr. Trimble.—I prefer letting the bean run to the top of the pole, and then turning it down. I consider nipping off the top only delays the crop.

Mr. Robinson.—A gentleman living in the western part of this State informed me that he raised the small white bean at the rate of eighty bushels per acre.

Mr. George H. Hite suggested hen manure in compost as a good substitute for guano, which is now selling at a very high figure—from $110 to $120 a ton.

Prof. Mapes said that he believed Lima beans may be profitably grown as a large farm crop, either for seed or for eating. They are now selling in Washington market at seven dollars a bushel.

Mr. Smith—The farmers of Lebanon, Conn., prefer the red bean, as the most profitable to cultivate. They sell very high in this city for shipping. They are easy to grow, yield well, and keep better than any other because they have a tough skin; the shape of the bean is long; it is not a new sort. We generally grow them among our corn.

Dr. Trimble.—I consider the Red Bush Cranberry bean as the most profitable of all the beans to cultivate.

Curing Beans.

Mr. Minot Pratt, Concord, Mass.—I perceive that in the report of the Farmers' Club, Mr. Robinson recommends the curing of white beans by stacking the vines around "stakes, like ordinary garden bean-poles," when it is necessary that they should be pulled in a green state. Now, this direction does not seem to be well adapted to the latitude of Concord, for I

tried the plan as you state it the last season, and lost my beans. In a discussion of the subject of "Harvesting" before our Farmers' Club, a few weeks since, a plan similar to that which you suggest was recommended and generally approved. It differs from yours only in this—that stakes should be used with branches left on them, long enough to prevent the vines from settling down into a compact mass, as they will do if the stakes are smooth. Perhaps the branches are a part of your plan, though it is not so stated. I am satisfied the smooth stakes are not safe for a wet season.

Transferring Plants from the South to a Colder Latitude.

Mr. Alex. Robeson, of French Mountain, Warren county, N. Y., writes for information upon the above question. He wants the opinion of the Club as to whether plants will do as well when moved northward as when moved on the same parallel.

Prof. Mapes replied that he should prefer pears from the same parallel, apples from the north, and peaches from the south. As a general thing, if a man is establishing a nursery, he will do well to obtain a stock from his own vicinity.

Flax.

Mr. Carpenter said that farmers were much more likely to go into flax culture than beans, as a staple crop the present year. He has lately been a good deal among them, and finds a perfect furor about flax growing. He thinks that more will be grown in Westchester county than has been grown before in forty years. The price of seed has advanced very largely already, on account of the demand all over the country.

Mr. Smith said that when sown for a seed crop in Connecticut, half a bushel per acre was enough. If for lint, a bushel per acre. The late H. L. Ellsworth grew one hundred acres for the seed one year in Indiana, and thought it a very profitable crop.

Mr. Robinson.—Flax will only produce about twelve bushels of seed per acre.

Prof. Mapes.—The high price of seed at the present time is caused by the high price of exchange, as most of the seed is brought from Odessa, on the Black sea, and from the East Indies.

Marble Head Cabbage.

Mr. Redmond asks whether the Marble Head cabbage is a good variety to cultivate.

Prof. Mapes.—Yes, it is a good variety, and not a humbug, but no better than the Flat Dutch, which is the kind that the market gardeners grow mostly for New York market.

Mr. S. Carpenter.—I prefer the Drumhead Savoy, particularly for domestic purposes. The heads are large and solid, and keep sound till spring.

Pruning Old Grape Vines.

Mr. Robinson.—We are frequently asked for information in relation to pruning old grape vines, which have been allowed to grow several large stems. Will Mr. Fuller give us information on this subject?

Mr. Andrew S. Fuller.—No rules can be given, without seeing the vine. It will not do to cut away these stems, so as to start anew, because that would kill the roots; but I would cut back the top as far as it would be safe, and grow new arms, and make a new top, according to the most approved method. I would train the most thrifty shoots of the old vine, as ow as I could horizontally, so as to grow fruit-producing wood upon the renewal system.

Pears that Keep till June.

Dr. S. G. Parker, of Ithaca, presented a specimen of pears that keep till May or June, when it is a tolerably good eating pear, not mellow, but sweet and satisfactory at that season. The name is unknown; the tree is an old one and bears full every year.

Mr. John G. Bergen, of Long Island, said that it resembled in size and appearance the old Pound pear, which is good to cook, but not to eat, and never gets mellow, though that does not generally keep as long as this.

Dr. Parker said that this is not a good cooking pear, and is not used for that purpose. Its value is in its long keeping. If worth propagating for that, he will send some scions for distribution.

Mr. Carpenter thinks it must be the old Pound pear, or a seedling from it, but will gladly try some scions to prove whether it is worthy of cultivation. He hoped the Secretary would take charge of this pear and see how long it would keep.

Growing English Filberts.

Mr. Solon Robinson.—I hold a paper prepared by the chairman of this meeting upon growing the Kentish filbert in this country. He says: "The following extract from the Encyclopædia Americana, contains information which may be acceptable to those who, like myself, have filbert bushes, five or six years old, which have shown no signs of fruit. Now is the time to commence the pruning treated of in this extract, which reads as follows:

"Varieties are propagated by layers or suckers; varieties can be grafted, etc. They are planted in open ground, ten feet apart. They are suffered to grow almost without restraint for about three years, and are then cut down to within a few inches of the ground. They push out five or six shoots; and these in their second year are shortened one-third. A hoop is placed within the branches, and the shoots are fastened to it at nearly equal distances.

"In the spring of the fourth year all the laterals are cut off nearly close to the principal stems, and from these cut places short shoots proceed, on which the fruit is expected the following year. Those which have borne fruit are removed by the knife, and an annual supply of young shoots is thus obtained. The leading shoots are always shortened two-thirds, and every bearing twig is deprived of its top in the early spring pruning. Attention should be given that a supply of male blossoms be left, and all the suckers must be carefully eradicated."

Mr. Fuller said that he thought it right to caution people not to expect any great results from growing filberts. There are bushes in Mr. Prince's garden, at Flushing, which, although growing well for twenty years or

more, have never borne fruit. I have had the bushes growing five years in my garden, without any good results, and I know of but one man, a Mr. Butler, of Brooklyn, who has been successful, and he only in a very limited degree. The filbert is a tree rather than a bush, and some of Mr. Gilbert's are six inches in diameter, but they are all diseased. If pruning, as recommended in the extract read, will cure the disease, it will be valuable, for the fruit sells at twenty-five cents a pound. Our hazel is a bush, and never grows to such trees as Mr. Butler's filberts, some of which are ten feet high, and have a broad spreading head. The hazel grows up straight, slender canes, two to five feet high, bearing the fruit at the top. There are two kinds: one bears the fruit in clusters, and the other separate, with long, tapering husks.

Strawberries—How to Grow them and what Kinds to Grow.

Mr. Robinson said:

As a general thing, there is nothing about the farmer's home more neglected than small garden fruits. Many have no strawberry bed; and others, who have one, do not seem to understand that there is as much difference in strawberries as in corn or potatoes; and that it is important to have a variety. Sometimes one sort will produce well one year, and sometimes another; and one kind comes early and another late. Currants, too, are not all alike; neither will the farmer receive the greatest profit from them when they are suffered to grow up like a neglected hedge along the garden wall. To induce a more extensive growth of these small fruits, I intend to give some practical information, and such hints upon the use of fruit in a hygienic point of view, as will encourage the wives and children of farmers, if it does not them, to extend its culture. In families where garden fruits are used the most extensively, you will always find the greatest degree of health. Instead of producing summer complaints in the bowels, they are the very best preventives. Beside having some of them upon the table every meal while in season, you should preserve such quantities in sealed bottles or jars, that you can have them every day until strawberries are ripe in June.

We suppose we need not offer arguments to any one who has ever grown strawberries in the garden, to prove that no other fruit or vegetable can be grown with greater profit, whether for sale or use. They are healthful because they are the first garden fruit, when nature craves just such subacid food as the strawberry, and if produced in such abundance, of the most choice varieties, that all the family can eat to their hearts' content, we are willing to guarantee that while strawberries are in season there will be very little occasion for calling in the doctor. Therefore, for the promotion of health, wealth and happiness, we urge farmers to pay more attention to their cultivation.

THE BEST VARIETIES OF STRAWBERRIES.

There are so many conflicting opinions that it is difficult for a farmer to tell what sorts to order. Perhaps the following opinions will aid him. I believe that the new seedlings, known, or to be known, as the "Tribune strawberries," will become great favorites, but it will require some

years to make them abundant. Every locality has its favorite, and many individuals hold fast to the kind always grown in the family, and will not inquire whether there is a better one.

In 1859 the strawberry question was ably discussed before the American Institute Farmers' Club, and a committee was appointed to name six strawberries most worthy of general cultivation, in the order of their value. The committee reported the following, which were approved by a full meeting:

1. Wilson's Albany. Its good qualities are productiveness, size, and firm, juicy flesh. It is, however, *too acid* for the taste of many.

2. Longworth's Prolific. Early, large, and of excellent flavor; only moderately productive; sometimes running too much to leaf.

3. Hooker. Good size; of a rich, sweet flavor; moderately productive.

4. MacAvoy's Superior. Productive, large, and of excellent flavor; berries often defective in form.

5. Hovey's Seedling. This variety is too well known to need any description. Its only defect is dryness and want of high flavor.

6. Burr's New Pine. Of exquisite flavor, medium size, only moderately productive; plants want vigor and hardiness.

At Boston, the same season, the question was discussed by the Horticultural Society, and a ballot taken as to the best six varieties for market, which resulted as follows: Early Scarlet, 19 votes; Wilson's Albany, 19; Hooker, 11; Hovey, 10; Triomphe de Gand, 8; Burr's New Pine, 6; other varieties, 1 to 4 votes each.

Another ballot was taken for the best six varieties for amateurs, which resulted in the following list: Early Scarlet, Hooker, Burr's New Pine, Hovey's Seedling, Wilson's Albany, and Triomphe de Gand.

During the last two years the Triomphe de Gand has gained very much in favor. Several large cultivators, including Mr. Knox, of Pittsburgh, consider it the most profitable of all for a market crop. Of other sorts we remark:

The true Bishop Orange will be good for a late ripening crop, and is remarkable for its beautiful orange scarlet color, and for its productiveness.

The Jenny Lind is very early, a good bearer, double the size of Early Scarlet, fine color, well flavored, productive, and a favorite in New England.

Peabody's Seedling is a very shy bearer, and is nowhere a favorite at the North.

Prince's Scarlet Magnate is a beautiful sort, and a rampant grower.

The Bartlett, said to be a new seedling, originating in Brooklyn, N. Y., is an excellent strawberry.

The pleasantest flavored strawberry grown is Burr's New Pine, and Swainstone's is the richest, but these are not productive sorts.

The Austin, originated by the Watervliet Shakers, is a good late berry for family use, but the fruit is too soft for transportation to a distant market.

The Boyden Seedling is noted for its mild character, which is such that the most delicate invalids may use it with impunity. It grows to a large size, is a very delicious berry, but rather a shy bearer.

The White Alpine may be cultivated for variety, and for late production, but the fruit is small, and the vines not productive.

A correspondent in Westchester county, N. Y., says:

"We have made the following selection for our own use, all of which have their points of excellence, to wit:

"Wilson's Albany Seedling, the most prolific, and, when its large berries are well ripened, not too acid. The trouble is that servants will pick them before they are ripe, because they are red a full day in advance.

"Hooker's Seedling grows vigorously and is productive; fruit excellent; large size and a handsomer red than the Wilson, which is very dark. It is one of the best for family use. It was originated in 1850, by H. E. Hooker, of Rochester.

"The Bartlett we consider equal to either of the above.

"We grow the Austin Seedling because it ripens later than the others.

"The Hovey is a very shy bearer in our garden. The Jenny Lind is not so promising as it is said to be in Massachusetts. MacAvoy's Superior is good for family use, but too tender for marketing; and so is Burr's New Pine, but is of high flavor and requires high culture.

"Prince's Eclipse, Scarlet Magnate, and Climax, are all handsome sorts, and wonderfully vigorous growers.

"The Boston Pine produces an excellent berry, round, deep crimson, very handsome, and like the Bartlett.

"The Genesee is a good sized, long necked berry, very mild, but not very excellent.

"The British Queen is a high flavored strawberry, and in England it is considered the standard of perfection. Fruit irregular in shape.

"Longworth's Prolific, originated by the celebrated Nicholas Longworth, of Cincinnati, is an excellent family berry.

"The Peabody strawberry, originated by Chas. A. Peabody, of Columbus, Ga., and sold by him at a high price, is not worth so much for cultivation with us as several other sorts.

"Rivers's Eliza, an English sort, has the highest reputation of the imported varieties. The fruit is large, rich, and juicy, but the plants do not stand our hot, dry weather very well.

"The Red Alpine, a native of the Alps, will produce an autumn crop if the spring blossoms are cut off.

"Scott's Seedling grows one of the handsomest strawberries of the family; it is a very bright crimson, large, conical form, and rather high flavored.

"Beside these we have one called Chili, to which we can give a high recommendation. These make up a fine assortment, but we cannot advise farmers generally to try to cultivate more than three or four good sorts, embracing an early, medium, and late ripening kind."

SEEDLING STRAWBERRIES.

Seeing what wonderful improvements have been made within a few years, every one who can devote attention to it should continue the effort to obtain a still better seedling than has yet been produced. We shall hope on till some enthusiast gets a seedling as large and prolific as the

Wilson, and as high flavored as the Swainstone, British Queen, Rivers's Eliza, Boston Pine or any other.

STAMINATE, PISTILLATE AND HERMAPHRODITE BLOSSOMS.

It appears to be a settled question that there are three distinct forms among the blossoms of strawberries, and that two of them will not produce fruit, except by impregnation, one with the other. These are called male and female flowers; the male flower growing stamens without pistils, and the female flower pistils without stamens. The other, called hermaphrodite, is furnished with both, and has the power of self-fertilization in each blossom. The female, or pistillate flower, has a golden center, the pistils covering it like short, stiff hairs. The male, or staminate flower, has a dark center, from which grow a dozen or more stamens, which are little stems with knobs on the ends, which bear the pollen, that must come in contact with the pistils to fructify them. Some plants bear all staminate and some all pistillate flowers; and when that is the case, unles the two sorts grow in proximity, both will be nearly destitute of berries. It is often observed that strawberry blossoms are abundant in the fields, and fruit scarce. This is owing to the sexuality of flowers, and the lack of favorable circumstances to produce impregnation. The great scarcity of bees in many of the old States, cuts off one of the great means by which nature carries on the work of fecundation of flowers.

Some varieties of strawberries always produce hermaphrodite flowers, the center of which is like the pistillate, with stamens growing around it, as they do from the center of the staminate flower. This kind of blossom will produce fruit if there should be no other sort growing near.

Although a pistillate variety will not produce without the aid of staminates, if the two kinds are set together the staminates soon outgrow the others, and so take possession of the ground, that in three or four years the bed affords but a meager supply of fruit. Great care, therefore, must be used in cultivating strawberries, not to let the barren, rapidly growing male plants overpower the female ones, which are the true fruit bearers.

SOIL, PREPARATION, AND CULTIVATION FOR STRAWBERRIES.

The best soil is that lately in forest, of a gravelly loam character, situated on a gentle southeastern slope, and should be underdrained, spade-trenched, or deeply subsoiled, and made rich and mellow before setting the plants. If underdrained thoroughly, it will soon pay the cost in extra productiveness. If possible, protect the north and west sides by high fences or hedge. The best manure is wood mold and unleached ashes, and what is known as the "lime and salt mixture"—that is, a bushel of salt in just water enough to dissolve it—and that used to slake three bushels of lime. Shell lime is best. If land is parched with drought, without artificial watering the fruit will be deficient, though all other requisites are complete. All the fertilizers should be mixed in the soil before the plants are set. Twenty or thirty bushels of ashes, three bushels of salt, and nine of lime, may be used on an acre, and the more the soil is stirred in its preparation the better; and it should be as free of weeds and grass as possible.

When ready to set your plants, rake the bed smooth, and mark off the rows, and procure strong rooted plants, and dip the roots, as you proceed

in water, thick with rich earth or compost, and set them no deeper than they naturally stood, being careful to cover with fine earth well pressed.

If you intend your bed to cover all the earth, set the plants a foot apart each way. If to be kept in hills, two feet apart. If in rows, make them three feet apart, and the plants eight to twelve inches apart in rows.

There is no wrong season, when the plants are not bearing, to transplant strawberries. Perhaps the best time is after the old roots send out runners, and the first of them get well rooted. Then cut the connection with the old stool, and keep the new root from sending out runners until it becomes a strong root; and then, if your new bed is to be made in the same locality, take up the plants with a transplanting trowel, with all the dirt that will adhere, and lay them on boards and carry right to the spot where they are to be set, and put them in suitable holes, scooped out with the trowel or hand, and they will keep on growing almost as freely as though they had not been removed. Keep the ground free of weeds, and frequently stirred between the plants till winter, and then cover with forest leaves, held in place by brush or a little dirt scattered over. In the spring rake the leaves off the plants, and leave them between the plants as a mulch. After fruiting, the runners begin to put out. If your plan is to keep distinct hills, cut off all runners every week. If your plan is for rows, keep working between the rows, and turn the runners so as to form a growth of plants a foot wide, leaving a space for working two feet wide between. This is the best plan for field culture, working the beds by horse hoe. When the rows get grassy and need changing, run the subsoil plow deeply and repeatedly through the rows, and work in the necessary fertilizers, and prepare a new row of plants by setting or training runners to the right spots, and let them set themselves, cutting away all the surplus ones. Then late in the fall the old row is to be completely turned under by the spade or plow; and so this system of renewal may be continued, turning down a portion of the old bed each year, and thus having vigorous plants always in full bearing.

Where the plants are set with the design of covering all the surface, the runners are permitted to spread where they will the first year, and the second year the poorest plants, old or young, should be cut out, so as not to allow the bed to become matted. When it begins to fail, from being overrun with weeds or grass, or from the plants becoming feeble from age or want of room, divide it into strips two feet wide, and turn under alternate ones, and fertilize the ground for a new setting of plants to spread over it from runners; and when they are well established, turn over the other strips in the same way, and so continue. At every new preparation of the bed add ashes if you can, or bone dust, or superphosphate of lime, or fine compost, in which rotted sods, leaves and wood mold hold the greatest share, and then no other manure will be necessary while the plants are in bearing, except the mulching of leaves, straw, or salt hay that you should give every winter. Where it can be had conveniently, always get spent tan-bark for mulching. Tanners' chips are a very good substitute, and so are leather shavings. When any fine material is used for mulching, be careful not to smother the plants. Sawdust, and also scrapings from the wood pile, may be used, if care is had about smothering.

Covering the ground permanently with saw-log slabs has been practiced with good success. The plants were set in well prepared soil, in straight rows, one foot apart, and then slabs notched on the edge, about three inches deep, were fitted to the plants, so that they grew in bunches in holes about six inches wide, and of course free from weeds and grass. By this plan no new plants are made from runners. If such are desired, a bed must be kept for that purpose. The old stools of strawberry plants, after a few years, grow so much above the surface that they are not productive. Hence the necessity of frequent renewals.

In transplanting strawberries in the same garden, or near where the plants are obtained, take up the plants with a trowel, when the ground is moist, with a good ball of earth adhering, and set them out immediately, and they will not stop growing. We have moved them so when budded, and they bloomed and bore fruit almost as well as though not transplanted. Never set the plants any deeper than they originally stood. Although we should always prefer new plants, yet it may be remembered that the art of transplanting old roots, even those that have become barren, causes them to send out newly bearing crowns, and so become fruitful again. It is also recommended by those who have proved its value, to hill up all stools with fresh earth, which has the effect to make them fruitful again.

Watering in a dry time is highly important. It will keep the plants in bearing twice as long as without it. Charles A. Peabody, of Columbus, Georgia, has certainly been one of the most successful strawberry culturists in this country. He has carried berries to market more than six months of the year, and he obtained them by copious watering with a movable pump—a garden engine. He planted his beds upon sandy land, newly cleared of pine and oak timber, choosing a flat near a little brook, on account of convenience of water. He used no other fertilizer at first than what was obtained by burning the timber and brush, and scattering the ashes, and afterwards by mulching with forest leaves. After the fruit season, his practice was to have a hand go through with a hoe and cut up the poorest looking plants, so as to keep them from getting too thick; and then the mulch being put on, the runners are prevented from setting, and are afterwards cut away. He is careful to leave all the vines cut off on the ground, considering them the best fertilizer. This is true in regard to all kinds of plants. The ashes are the best manure for the same kind growing.

Mr. John G. Bergen.—I would ask if there is any virtue in pine leaves as a mulch for strawberries? I consider pine leaves the best material for covering strawberry beds in winter, as well as for covering the ground when vines are fruiting.

Mr. Cavenach.—A friend of mine uses the pine leaves as a mulch; it looks clean and neat, and not liable to be blown away. The plants come up in the spring very readily; it is much better than salt hay or any mulch I know of.

Mr. Wm. S. Carpenter.—I think there is great virtue in pine leaves, more than in their mere action of a mulch. I have seen strawberries grow under pine trees, the leaves of which mulched the plants; the strawberries under these trees were better than where there was no mulch. I am not in favor of mulching except to prevent the soil from damaging the crop.

Mr. Smith.—Rye straw applied late in the season is an excellent mulch, and prevents the alternate freezing and thawing in the spring. I put on mulch in March upon autumn-set plants, and in autumn upon those set in spring. I have tried moss as a mulch, and found that it injured the fruit.

As to the remarks of Mr. Robinson about planting strawberries, it depends upon variety how they should be treated. For instance, the Early Scarlet should always be grown in beds, the Triomphe de Gand always in hills, and all the runners should be as carefully trimmed off as we prune grape vines.

Dr. Parker.—The strawberry-growers in Tompkins county have an implement drawn by a horse, with sharp knives that run close to the hills and cut off the runners. They keep the plants in hills, 30 or 40 inches apart.

Mr. Smith.—I have practiced the southern mode of raising strawberries; in the early spring I set fire to the mulch and dried leaves, and burn the whole off, and leave the beds perfectly bare. The crowns of the plants were not injured and came up finely, and bore a very large crop of fruit. This kills the weeds and benefits the strawberries. We then plant onions between the rows, and the cultivation of them keeps the bed clear of weeds.

Mr. A. S. Fuller.—I think the plan adopted by Mr. Smith a very expensive one, for my mulching costs full fifty dollars per acre. I am pleased with this mulching with pine leaves; it is the first time I have ever heard of its use. I know it must be a good mulch; it allows the air to circulate and aerate the soil. I am in the habit of using salt hay; it is fine and lays close; tan bark is an excellent mulch and does not require much cultivation; it keeps the weeds down and the land moist, and should a large weed come through it, cut it out. I have also used moss, but this holds the moisture too much; the fruit grows large, but they have a very poor taste.

Mr. Wm. S. Carpenter.—The observations of Mr. Fuller give some new light on this subject; this mulching is not only to keep the soil moist, but to protect the plants from the weather; I should think it would have a tendency to rot the plants. I have found corn stalks a good covering for strawberries. Any covering makes the soil more mellow, and if straw is used it will be found economical to chaff it, for that makes it a better covering, takes less, and does not blow off as readily as whole straw.

Mr. Cavenach, of Brooklyn, said that one man covered his strawberry bed with rye straw, pretty thick, and all the plants smothered. He knows one man who uses sea-weed, which is a light, open stuff, with good success. Near the coast it is a very cheap covering, costing only fifty cents a load. Burning the mulch, as mentioned by Mr. Smith, might do for plants set out in the spring, but I should be afraid to try it upon old plants, as many of the roots are upon the surface, or very little below it.

Dr. Parker.—If seed clover straw will answer, that with us would be the cheapest covering, as it is worth nothing, while rye straw is worth \$3, oat straw \$6, and wheat straw \$4 a ton.

Subject for the next meeting, "Pruning of Fruit Trees."

Adjourned. JOHN W. CHAMBERS, *Secretary.*

March 26, 1863.

Mr. E. Doughty, of Newark, N. J., in the chair.

Sheep Disease.

Mr. D. B. Knapp, Clark's Mills, Wisconsin, says that the scab has made its appearance in that heretofore healthy country, and asks the Club for a remedy.

Mr. Solon Robinson.—This disease is fully treated in books upon sheep husbandry. Youatt recommends mercurial ointment. The disease is a very infectious one, and is most apt to attack a flock of sheep in a state of poverty.

Applying Lime and Bones.

Mr. E. S. Marshall, of London Grove, Chester county, Pa., says:

"I shall plow a sod field and spread on fifty bushels of lime to the acre, after it is plowed. Now, what I want to know, is, will the lime and bones both do together? I wish to sow the bones on after the ground is plowed. I can buy acid and dissolve the bone if it would be better. The field that I intend to plant with corn I always spread on my lime the year before I plow for corn, but in this case did not get it done. Will it do to put on both lime and bone together?"

Prof. Mapes.—This question is easily answered. It will not do. The lime will retard the decomposition of the bones so as to render them of but little present value; and he would be no better off if he should use acid, because the lime, having an affinity for sulphuric acid, would seize it away from the bones, and the result would be sulphate of lime—common plaster. He cannot afford so expensive a process to obtain that article. Mixing lime and bone as proposed would deteriorate full three-fourths the value of the bone. For immediate use I had rather have five bushels of bones treated with sulphuric acid than fifty bushels unprepared.

Keeping Apples during Winter.

A correspondent says:

"Buckwheat hulls, separated in bolting the meal, are excellent to pack apples, and they are worthless for feed. Cover the bottom of your barrel with hulls sufficient to keep them from the wood, then put a layer of apples and another layer of hulls, and so on. Have your apples ripe and dry, and if your cellar is damp they will not gather moisture as soon as if packed in other brans, or grain of any kind. Turning shavings are very good, if well dried, to pack apples in. Try it."

Mr. Wm. S. Carpenter said that if buckwheat bran was good, it was unlike all other bran. Fine cut hay is good. So are leaves. Rice hulls are the best material. Sawdust is not good; it is apt to impart its flavor to the fruit.

Prof. Mapes.—That is the case with many substances. If sawdust is to be used it should be thoroughly baked. Cotton, coal, clay and paper extract flavor. Bone charcoal will destroy the flavor of the richest fruit.

Dr. Trimble.—I hope the use of buckwheat hulls will not be condemned, as this material can be procured in nearly every part of our country.

Rhubarb Wine.

Mr. P. L. Merritt, of Bainbridge, N. Y., says that agents are traversing the State making extravagant representations in regard to wine produced from the rhubarb plant; and by exhibiting samples of the wine are inducing many farmers to go largely into the cultivation. As he does not like to be humbugged, he asks the opinion of the Farmers' Club upon the subject.

Mr. Solon Robinson.—The only humbug in the case that I have heard of, is that these agents are selling the roots of the common pie-plant upon false representations of its being something peculiar, and more productive of wine than anything that can be obtained from any other source; when, in fact, a beverage called wine can be made from the stalks of any rhubarb plant, though, perhaps, the kind known as Linnæus is the best.

Prof. Mapes.—I have been in the habit of making wine from rhubarb, but after all it is nothing but rhubarb cordial. It is a beverage which may be made in large quantities from the stalks of the rhubarb—some persons have stated as large a quantity as 2,500 gallons per acre. No doubt an acre will produce four times as much as an acre of grapes, and it has been sold for $2 per gallon, but if the farmers of central New York are going largely into the business the market will be glutted so that it will be hardly salable at any price. Besides, it is probable that large quantities would be made, worthless for any purpose but vinegar. A good article cannot be made unless the cane sugar is converted into a product resembling grape sugar. This is done by first converting it into rock candy and then boiling twelve hours in water slightly acidulated with sulphuric acid. The acid is afterward neutralized with the cream of chalk stirred in as long as it produces any effect. The stalks may be cut in a common chaffing machine, and pressed in a cider mill. Put eighteen gallons of the juice in a cask of thirty gallons, with ninety-six pounds of the prepared sugar, and fill up with water. It will then ferment seven or eight weeks in a temperature of sixty degrees, when it should be bunged tight and kept till spring before racking off. It must be bottled or drawn into another cask before the weather becomes warm, else it will take on a second fermentation, become turbid, and then cannot afterward be fined. If drawn into a clean cask, it is better to stand until the next autumn before bottling, or it may be kept, as well as any other wine, in the cask. I have some which has stood in my cellar five years, has been repeatedly drawn from, and by many persons is liked better than grape wine.

When to Prune and When to Cut Timber.

An Indiana correspondent thinks that "a young orchard, that is growing, should not be trimmed until the trees have received the full benefit of the preceding fall store of starch and nitrogen, as these substances form the organic structure of the tree. If it is trimmed too early, a great quantity of nitrogen is lost, the tree and its growth proportionably checked; and we would prefer, in old bearing trees, to defer trimming until the apples were one-third formed. The proper time of cutting timber is about the middle of August, as then the wood will be nearly, if not quite, ripe;

the season varies, as near as I can tell, three or more weeks. The more starch in the tree the faster it will rot; water and warmth will change its condition in a few hours, and with it the organic structure of the tree."

Mr. W. S. Carpenter.—The time to prune depends entirely upon the object. If it is to produce an increased growth of wood upon the tree, pruning may be done in autumn or early winter.

White Willow.

Mr. Samuel W. Langley, Henderson, Ky., wants to know where to get white willow, and when to plant it.

Mr. Solon Robinson.—I believe the ordinary willow growing in large trees in this part of the country is the same kind as that about which such a *furore* has been raised in Illinois. But no one has thought of cutting up limbs into short pieces, and selling them at seven dollars per thousand. The right time to plant such cuttings is from the time the ground thaws out in spring till the leaves begin to grow.

Rot in Potatoes.

Dr. Samuel Heirston, of Chester county, Penn., thinks that if sound seed is planted in good land, without manure, there will be no disease—that it is always more prevalent upon low land, and always accompanies high manuring.

Mr. Robinson.—Now, to offset this theory, I will reiterate the fact that I have stated here before. In 1861 I planted *sound* potatoes upon a gentle slope to the southeast; soil, dry loam, deeply worked; was in sod two years previous; was dressed with muck and bore corn; the next year dressed with well-rotted stable manure, and bore cucumbers and turnips; then was plowed and subsoiled, and planted with potatoes, without manure, except salt scattered along the row below the seed. The plants were dressed during growth with plaster and wood ashes, and ground kept clean. The varieties were Prince Albert, White Mountain, Davis's Seedling, and a few experimental hills of half a dozen other sorts. I had had no rot the year before, and therefore know the seed was sound. The crop rotted worse than any other I ever grew. The Prince Alberts were nearly all lost.

Mr. Carpenter.—I think the trouble with Mr. Robinson was that his potatoes were all old varieties; the way to escape the rot is to plant none but new sorts. I believe that all potatoes have their period of existence, and then they rot and pass away. As soon as I find a variety begin to rot I discard them. I approve of the new seedlings. I would send to Mr. Goodrich, in this State, or Mr. Bulkeley, of Williamstown, Mass., for the varieties of the new kinds they are introducing.

Mr. Robinson said that the six sorts alluded to were all new seedlings, and all rotted equally as badly as any of the old varieties.

International Agricultural Exhibition at Hamburg.

Messrs. Austin Baldwin & Co., the agents for this exhibition, having called the attention of the Institute to the importance of having a full

representation of American agricultural implements and machinery and agricultural productions at the exhibition which will be held at Hamburg, one of the free cities of Germany, in July next, the Trustees of the Institute considered the subject, and, deeming it of great importance that some immediate action should be taken, asked the Farmers' Club to bring it before the members at their first meeting.

Prof. Mapes.—We already send a vast amount of American agricultural implements to Germany. I think the exhibition would be the means of greatly increasing that trade.

Dr. Trimble said that he cared but little for the trade, but he did care to have this country express a reciprocal feeling for the great interest which Germany has taken in the affairs of this country.

Mr. Disturnell offered the following resolution:

"*Resolved*, that a committee of seven be appointed for the purpose of representing the interests of the Farmers' Club of the American Institute in this great national enterprise, and to act in connection with other interests favoring the same purpose."

Which was adopted, and the following gentlemen appointed the committee:

Messrs. Hugh Maxwell, William S. Carpenter, Isaac P. Trimble, R. G. Pardee, J. A. Nash, Martin E. Thompson, and John G. Bergen.

The Fence Question.

Mr. Alex. Hammond, Rockford, Ill., wants the Club to continue to agitate this question, and sends a paper to show what they are doing in Illinois. He says:

"I am glad to see this subject discussed by so high authority as the New York State Agricultural Society. The idea of no fences will prevail, and we in this country will be the first to practice it. It is impossible that the farmers on these prairies will forever be foolish in this matter. The reasons for doing away with fencing here are greater than in any other part of our land. Many, to whom the idea never occurred before, readily approve of it; and others, whose first impulse was to ridicule, on reflection say it is right and practicable. The idea is radical, and new to most farmers, but it immediately secures intelligent and powerful advocates. The discussion at the State fair, and at the recent meeting in Albany, as well as in the American Institute Farmers' Club, is beginning to open farmers' eyes. Keep the subject before them, and if they can learn to dispense with fences it will be worth more to the country than all the gold mines of California."

The following resolutions were passed at a Farmers' Club meeting in Winnebago county, Illinois:

"*Resolved*, That every one ought to restrain his stock on his own premises, and not require others to fence against them.

"*Resolved*, That our present system of exterior fencing is compulsory, and consequently in many cases unreasonable, unjust and oppressive.

"*Resolved*, That all fencing should be voluntary, every man being allowed to consult his own time, his own interest, and his own taste in deciding when he shall fence, where he shall fence, and how much he shall fence.

"*Resolved*, That stock raising, as at present pursued by us, is a losing, instead of a paying business, and that this loss results from our fencing.

"*Resolved*, That general fencing is not a necessary part or condition of prairie farming, but an expenditure without compensation, and, therefore, ought to be abandoned."

Mr. Solon Robinson.—I move that this Club approve these resolves, and that they be laid upon the table for future discussion.

This was unanimously agreed to.

New Jersey Tobacco.

Prof. Mapes exhibited specimens of tobacco grown by Mr. Mulford, at Orange, New Jersey, of a very fine quality for cigar wrappers, and distributed a quantity of seed for experiment in other sections of the State.

Mulching Strawberries.

Dr. Parker, of Ithaca, N. Y., says:

"The most approved plan here is to cultivate with no mulch, hoeing once a month, or otherwise stirring the soil, and with free use of stable manure on our richest clay soils, for the Wilson and its numerous and better flavored seedlings, so far as the latter have been tried.

"But, gentlemen and ladies of the Club, when, as farmers and farmers' wives, you speak to the brothers and sisters of the farm of the whole land, it is necessary to recollect that the spade, the hoe and the hand rakes are tools that we farmers out in the country do not appreciate or use very well. Hence we need a culture of the strawberry that dispenses with these.

"Please tell all 'country folks' that the great secret of the strawberry culture is to cut off all runners, leaving not one in the bearing beds or grounds. Not half 'of us in the country' know that. And that he who is too indolent to cut off runners better let strawberries alone."

Sending Plants by Mail.

Dr. Parker.—Last year I dug up 150 Wilson plants just as the leaves began to open. Cut off long roots and the young green leaves; packed in oiled paper; sent them 256 miles by mail, at one cent per ounce. They were set out, and bore three pints of strawberries.

Wild Fruits of Minnesota.

Mr. Solon Robinson read a very interesting communication upon this subject from Mr. Alfred Churchill, which was listened to with marked attention:

"Kaneville, Kane Co., Ill., *March* 11, 1863.

"Herewith I send you a pound of Northern (wild) rice, which was gathered in Minnesota by the Chippewa Indians, and sent me by my daughter, she knowing that I was very partial to it while there.

"She obtains it from the Indians in considerable quantities in the fall, using what she wishes, and selling to them again in the spring, receiving sugar and furs in exchange.

"I believe that it might be made a commercial article of great value, being to my taste superior to the Southern article for food. There are thousands of acres, as I am informed, not harvested in the Northwest, and immense tracts of lake and river where it might be successfully grown. I presume that you remember seeing it growing in the Chicago and Calumet rivers in the early days of Northern Illinois. It is a beautiful plant.

"TO COOK THE RICE

"After washing put it in a colander and pour boiling water through it; salt to taste; put to cook in a covered vessel of the capacity of two quarts or more to a pint of rice, with just sufficient water to cover it; cook slowly two hours, or till parched white, adding water (but little water is required, as it should not be fully saturated) as required; keep the steam in and avoid stirring as much as possible; use as other rice.

"This rice will not grow; it has been beat to get the hulls off.

"In the beginning of the rebellion I was in Southwestern Missouri, and left to save my life. I went to Minnesota with some of my family, and staid a year, during which time I became quite interested in the natural products of the country, and was led to believe that there are many things growing there naturally, highly worthy of cultivation, and some are so abundant that if saved and put to use, would soon become of great commercial value.

"Besides the rice there is a bulbous root, apparently quite abundant, growing in water, which I saw the Indians using, that has the flavor of boiled chestnuts.

"The hop grows there wild to perfection, and in considerable quantities, as far north as 46 deg., and a perennial nettle (commonly called bastard nettle), without the vexatious spines, the bark of which is equal to the bark of hemp; and the white moss of the swamps looks to me like a good material for paper, with proper management. It attains a length of six inches to a foot, and covers the swamps like wool on a sheep's back.

"The berry fruits are numerous and abundant in the northeastern portion of the State, to which section my observations were mostly confined. The cranberry is very abundant, and by observing its growth, color, form, and keeping qualities, I ascertained that there are several varieties, some of which, if kept without being frozen, will remain sound the whole year, and then be just as good as the freshly picked berries. The cranberry, by its leaf, blossom, and structure of fruit, is an apple.

"The huckleberry is also very abundant and of superior quality, which, when dried, is equal to the imported small grapes, called currants, for culinary purposes. Most Northerners know its splendid qualities as a fresh summer fruit. There are several varieties of the blackberry, one of which, a low, bountiful bearer, is without a rival in the blackberry family. Three varieties of raspberry, very abundant. Two varieties of red and black currants. The fruit of one of the red varieties is large, covered with fine limber spines, and of excellent flavor. Strawberries are in endless profusion and variety.

"The willows which grow on the old beaver meadows, for basket work are far superior to those which our Illinois farmers buy the cuttings of at

great prices, and on the same meadows grows a bush, the leaves of which, in form and taste, are like tea; the blossoms also are like the prints and descriptions which I have seen of the blossoms of tea. There are a few bushes of the same kind in Illinois.

"I wish, through you, and the American Institute Farmers' Club, to draw attention to the fact that cotton is a first rate crop to plant on fresh broke prairie sod.

"While I was breaking my garden patch, in Southwestern Missouri, my wife and daughter dropped between the fresh broken sods quite a long row of cotton seed, also sweet and pop corn. The cotton matured so that when the bolls opened the row looked white, but the excessive drought of that season (1860) killed the corn when about a foot high. Old settlers told us that planting between fresh broken sod was the easiest and best way to 'make' cotton.

"Cotton may be grown profitably as far north as the first blossom which puts out will perfect its boll of cotton, for the reason that, if the season is only long enough for one boll to ripen it will be too short for many more to start, therefore more plants may be put on the ground.

"In latitude 40 deg., plant six inches apart in the drill, and two feet between the drills; in latitude 37 deg., eighteen inches in the drill, and drills three feet apart.

"Kansas can raise sod cotton enough the coming season to make 'right smart of' shirting.

"The cotton mills of these United States should immediately send agents furnished with seed, &c., to Kansas to advance the cotton growing interests."

Mr. J. Disturnell stated, in regard to the natural productions of Minnesota, and the Lake Superior region, might be named the wild rice, cranberries, the red raspberry, and the whortleberry, as flourishing in great profusion; also, different varieties of the pine, hemlock. spruce and fir trees, all of which are evergreens; the sugar maple and bircn tree also are found on high grounds in great abundance.

The forest trees are often of large growth where the soil is good, while sandy portions of the country are less heavily timbered. Often along the lake shore may be found a dense growth of trees, intermixed with fallen timber caused by the high winds which sweep over the whole region at certain periods of the year. This entangled forest it is almost impossible to describe, as trees in all stages of decay cover the ground for miles in extent.

For a healthy influence this region exceeds all other portions of the United States ; here *man* attains his full physical strength and endures the cold of winter as well as the moderate heat of summer, being at all times vigorous and capable of great bodily labor—here consumption and fever are almost wholly unknown.

Mr. J. Henry.—When in Washington, a short time since, I had some conversation with the Department in relation to planting the seeds of forest trees. There is an immense quantity of land in our country which might be planted with locust, which in the future would realize much more than the value of the land.

Adjourned. JOHN W. CHAMBERS, *Secretary.*

March 31, 1863.

Mr. Edward Doughty, of Newark, N. J., in the chair.

Tobacco Culture.

Prof. Mapes again distributed some seed of tobacco, raised by Mr. Mulford, of Orange, New Jersey, also some of the cured tobacco, a very superior article. Mr. Mulford has been very successful in raising tobacco. My superintendent, Mr. Quinn, made an experiment on my farm during the past year, which I will read for the information of the Club:

RAISING OF TOBACCO BY MR. P. T. QUINN.

The present high prices paid for tobacco will be sufficient inducement for the intelligent farmer to investigate the subject, and in case he finds that more money can be made by growing tobacco than corn or wheat, of course this crop may become one of the staples.

For the benefit of those who contemplate growing tobacco, I intend to give an account of an experiment on a limited scale made last year. My object was first to learn the yield per acre, and next, if the quality of the leaf, when grown on a clay soil in New Jersey, would equal that produced in the Connecticut Valley.

The seed was sown in the beginning of April in an open border, and except keeping the bed free from weeds and an occasional watering—no other care was taken.

The land intended for the tobacco was a clay loam, in good condition, being what would be called a "rich soil," well prepared by cultivating, &c., &c.

In the middle of June the plants were taken from the same bed (one-hundred) and planted on hills, eighteen inches in diameter, and about two inches above the surface. The young plants were three feet apart each way, from center to center.

The young plants started to grow immediately, and kept on during the season. The horse hoe was run between the rows three times, and they received an equal number of hand hoeings. This comprised the entire cultivation; it was quite evident that tobacco needs no more cultivation than corn.

From the one hundred plants, fifty were allowed to mature the seed; this, of course, lessened the salable leaf; still the amount was large enough to satisfy me that, at present prices, tobacco is a very profitable crop.

In the latter part of October, the stalks were cut off near the surface, and carted to a building; then two stalks were fastened together and thrown over wires for the purpose of drying.

When the leaves became crisp, they were taken from the stalks, and dampened by covering them with a moist cloth. When they were pliable, each leaf was opened out carefully and placed on top of each other; when sufficiently large, say half a pound in a bundle, it was folded so that both ends of the leaves came together.

The produce from the one hundred plants was thirty pounds of salable leaf, besides four pounds of what cigar makers call "fillers." The yield

per acre at this rate would be one thousand four hundred and fifty pounds in round numbers, and at twenty-three cents per pound, would give over three hundred dollars.

The expense of preparing the soil is not quite as much as for potatoes, and the cultivation is very simple.

The land on which this experiment was made was in the very best possible condition, and of course, it is not to be supposed that on ordinary soil, the yield would be as large ; but still, at even half this quantity per acre tobacco would be far more profitable than corn or wheat.

Prof. Mapes.—The general directions for raising tobacco, do not differ materially from those usually given for cabbages. The plants well raised in hotbeds and transplanted somewhat earlier than the dates given above, leaves a longer season for growth and curing.

A correspondent, residing at Agawam, Massachusetts, gives the following mode of preparing the ground for the plants, and for cutting and curing the leaves:

PREPARING THE GROUND FOR THE PLANTS.

Now the fitting of the land for setting out the plants demands our attention. The land must be made very rich ; there is no danger of excess on this point. A crop that grows and comes to maturity in so short a time must have a powerful stimulus from which it can draw its sustenance. Land on which corn and potatoes grew the year previous, or some other crop, so that it is mellow, is to be preferred. As soon as the land is dry enough in the spring, the manure should be drawn upon it and plowed in at the depth of seven or eight inches. There should be at least fifty loads to the acre. After the land is plowed, it should lie for two or three weeks, and then be harrowed well, for the purpose of hastening the decomposition of the manure, and thus throwing its strength into the land, which may now be left till the time of setting out the tobacco, which is from the tenth to the twenty-fifth of June ; but the best time is from the fifteenth to the twenty-fifth. It is proper to remark that the later it is set out, if it comes to maturity before the frosts come, the heavier it will be ; but as a general rule, it is not safe to delay beyond the last named time.

SETTING OUT THE PLANTS.

The land must be thoroughly fitted for setting out the plants by plowing and harrowing, *when it is dry*, and consequently in good condition to work up, and thus be made mellow. The rows should be made three and one-half feet in width, and the hills two and one-half feet apart. If the land is very rich, the rows may be at the first named distance. A compost of guano and plaster, or hen manure and plaster, or ashes and plaster, and night-soil thoroughly mixed and decomposed with muck, may be dropped into the hill. The soil should be hoed to sufficient depth to protect from injurious effects of dry weather. The plants must be set when it rains, so that the ground is wet enough to adhere to the roots. The mode of setting is by a stick about one-half of an inch in diameter; sharpened at one end, and of convenient length, with which a hole should be made in the center of the hills, into which the roots of the plant should be introduced, and special care must be taken to press the dirt tightly around the

roots, or the plant will surely die. Should the sun come out hot soon after setting, the plants must be covered with plantain leaves or a wisp of green grass, and it may be necessary to water them, which should always be done at night, as at that time nothing is lost by evaporation. As few plants, comparatively, can be set at a time, it is not a great amount of labor to water, cover and uncover them.

I will now state that one of the best pieces of tobacco which I saw last season was raised upon sward land, upon which the manure was carted and turned under. After a short time the land was harrowed down smoothly, and then remained in that state till just before the time of setting, when a top-dressing of fine manure was applied, and the ground again well harrowed, so that the manure was thoroughly mixed with the soil, and the plants set out as above indicated.

ANOTHER MODE OF CULTURE.

Some prefer the following mode of culture: When the plants are large enough to hoe, the labor is materially lessened by going between the rows two or three times with a horse and cultivator. Care must be taken not to injure the plants; the dirt which has become hard about the roots may be carefully removed, and its place supplied by fresh, fine soil. The hoeing, which must be done three or four times, as the case may require, is about the same process as that required for corn. It must be kept free from weeds, for if permitted to grow, they will spoil the lower leaves of the plants. At this stage of the crop, the great pest is the tobacco worm, which must be exterminated, because he eats through the leaves, thus spoiling them for wrappers. And it is proper here to remark, that the leading idea in cultivating tobacco, *is to get as many wrappers and as few fillers as possible.* Take care of the wrappers, and the fillers will take care of themselves. The plants must be topped at a height of about three feet, and the suckers must be removed *so as to throw all the growth into the leaves.* In order to prevent the mischief and damage of the worms, and remove the suckers, it will be necessary to go through the tobacco fields every morning, or as often as can be conveniently done.

The crop is ready for cutting during the last days of August and the first days of September. When it is ripe and ready to cut, the suckers will grow at the bottom leaves nearest to the ground, and a faint yellow spot will be seen upon the leaf. It should not stand long after these appear.

CUTTING AND CURING.

We now come to the most important part of the cultivation; that of *cutting* and *curing.* If your ground was rich and well prepared, if your plants were healthy and well set, if the season has been favorable, if you have cultivated well, if you have kept the suckers cleaned out, and if you have kept it free from worms, you have a reasonable prospect of the most profitable crop which you ever raised. We must now attend to the cutting and hanging, the curing and stripping and packing for market. The cutting should be commenced when the dew is off (never cut when it is on) or about eleven o'clock. An old hand-saw is the most convenient instrument for this purpose, sawing close to the ground, and laying the plants

down carefully upon the ground, so as not to break the leaves. If the sun shines hot it must soon be turned over, or it will sunburn, which spoils it. After laying long enough to wilt and thus become tough, it should be piled up in small heaps far enough apart to drive between with the team. You are now ready to *hang up*. The poles in the tobacco-house having been prepared, should be about ten inches apart. A house whose posts are about fifteen feet high, will hang four tiers one above the other. The distance which they are hung upon the poles will vary according to the size of the plants. As a general rule, a pole ten feet in length, will take twenty-five plants upon a side, or about fifty plants. The plants are hung with twine wound alternately from one to the other. If hung too near together, it will pole-sweat and spoil, and become worthless.

The shed must be well ventilated, in order to prevent sweating. It should be so arranged that the air can have free circulation under the sills, and thus blow up under the tobacco. This is sure to prevent sweating. A tobacco house should be set about two feet from the ground, with hanging lids or doors, which will render it close and tight when the weather is too drying. After hanging till it is sufficiently cured, which is usually about the first days of December, it should be taken down in a damp day (not too damp), and put in piles and immediately stripped, and done up in hands weighing about one-half of a pound each; the wrappers being done up by themselves, and also the fillers. This part of the work must be nicely and skillfully done, as it very much affects the price of the article. After stripping, it should be carefully and tightly packed, wrappers and fillers in separate piles, and covered with some old carpets or blankets to keep it from drying up. It must be watched closely, as it will soon heat and spoil. To ascertain whether it is heating, raise the hands in the center of the pile and introduce your hand. If it is warm you must repack it, closely laying it, and it will prevent all harm from this source.

I have thus given my mode of raising tobacco, in accordance with my experience and observation; and all things being equal, there is a sure prospect of success.

Dr. Trimble.—I am tired of this continued discussion about the culture of one of the most noxious plants that ever grew. I have been engaged for years in observing the habits of worms and insects, trying to distinguish which are injurious and which beneficial to man. I have observed those which infest the tobacco plant. To uneducated minds, which are disturbed by the appearance of such things, these are the most disgusting of the whole family. Nature has adapted them to the consumption of such a disgusting food. Instead of destroying them, if I could, I would tenfold increase their numbers. I wish they were so abundant as finally to perish for want of food suited to their habits, after ridding the earth of this greatest of all growing nuisances.

Prof. Mapes.—I do not know that it is the business of this Club to set itself up as the conservator of morals for the public. Our business is to afford such information as will give to farmers the greatest benefits.

Mr. S. Robinson.—"I thank thee, Jew, for that word." I join issue with the gentleman upon *benefit to farmers*. If this Club had power to confer the greatest of all benefits possible to be conceived for the farmer, what

would it be? In my opinion, there is nothing so great, no other one thing that we could do that would benefit him so much, as to annihilate the tobacco plant from the face of the earth.

Carrots a Substitute for Coffee.

Mr. Asher H. Chapman, of Pendleton Hill, Conn., recommends carrots as a substitute for coffee, and thinks them much better than chiccory. One of its principal recommendations with Mr. Chapman is that it takes less sweetening. It is the very point upon which we should condemn it. We repeat our previous assertions, that chiccory is the best substitute for coffee that has yet been used. Mix one part chiccory, two parts rye, and one part coffee. It will make a beverage that at least one-half the coffee drinkers will prefer to pure coffee, and we are satisfied it is more wholesome. The rye should be carefully picked over by hand, clean washed, well roasted and ground. The chiccory should be cut in small slices, thoroughly dried, well roasted and not ground, and it should be thoroughly boiled. The coffee will then be clear.

Fruit in Michigan.

Mr. George Redfield, writing from Mill Point, speaks in the most hopeful terms upon the prospects of fruit culture in Michigan, particularly in its western portion: "Hundreds of acres have been planted within the last two or three years in this immediate vicinity."

Tree Cotton.

Mr. Thomas C. Buckmaster, Newburgh, writes:

"There is nothing that I read with more interest, or take more pleasure in, than the report of the Farmers' Club.

"Wishing for some further information in regard to the South American cotton tree, which you had under consideration some time since, and seeing the *pure* seed advertised by one Edward Tathesall, Wilmington, Del., I write to inquire whether he is reliable, whether the seed is reliable, and whether the former statements of this tree are reliable."

Professor Mapes.—A certain Mr. Kendall appeared before the Club last year, and made very flattering statements about this South America cotton tree, and deposited with me a quantity of seed for sale. Some months afterward, circumstances came to light which convinced me that Kendall was an impostor—that he never grew the tree in Maryland except as a hot-house plant; and any one selling the seed now with the recommendation that it will grow here, is either humbugged himself, or trying to humbug others.

Mexican Guano.

Upon motion of Prof. Mapes, a committee was appointed to inquire and report upon the value of Mexican guano, found upon the Atlantic coast, which, although destitute of ammonia, he says contains from forty to sixty per cent. of phosphate, which must make it a valuable application upon all well prepared soil, for that does not require ammonia. He does not allude to the volcanic phosphate or rock guano, as it is termed for that has been

proved nearly worthless, while phosphatic bird dung guanos, like some of the best samples from Swan Island, have been proved highly valuable, and can be procured at less than half the expense of that from the Chincha Islands, which is now selling at the extravagant price of $100 per ton.

Mr. Eli H. Cope, of Westchester, Penn., writes to inquire if Sombrero guano can be made to take the place of bones as a manure.

To this we answer, yes. It has been made to take the place of stones in building a dock in Connecticut, where a ship load of it was imported for the purpose of taking the place of bones, but experiments proved that it was more valuable for dock building. We think that question is answered.

Dr. Trimble, of New Jersey, earnestly recommends the substitution of Jersey marl in place of guano. Thousands of acres of land are underlaid with marl, where it can be obtained for one dollar a ton.

Mr. Carpenter.—I am willing to concede all that is claimed for marl upon the almost barren sands of New Jersey. Upon the coast of Long Island Sound it is of less value than Sombrero guano. It would not even answer for dock building. I approve of the appointment of the committee, but think we ought to be careful not to recommend anything that is not of value to the farmer.

Professor Mapes.—It is wonderfully valuable upon my sandy farm in Burlington county; it is utterly valueless upon my farm at Newark. One bushel of ashes is worth a thousand bushels of marl upon that soil. In Burlington it beats my own phosphates. It is a great mistake to recommend green sand marl as a universal manure.

Mr. John G. Bergen.—It fails upon Long Island, which is as sandy as New Jersey. The greatest objection to the use of marl is the cost of transportation, as it requires some 400 bushels per acre.

Prof. Mapes.—It varies very much in quality. From some of the marl pits, if 30 bushels, after being exposed to the atmosphere for some time, be applied per acre, a very favorable result will be produced. Some marls are improved by mixing with lime, for they contain a considerable proportion of copperas, which by the action of lime is changed to gypsum.

Messrs. Mapes, Pardee and Berti were appointed the committee.

Prof. Mapes.—Can any one inform us how to restore the heat to an old hotbed? I have applied fresh manure to the outside of the bed.

Mr. Wm. S. Carpenter.—I have known spent hops to make a good hot-bed.

Preparation of Night-Soil.

Mr. Isaac G. Darlington, Westchester, Pa., writes:

"I would very much like to hear the opinions of the Farmers' Club on the best plan of preparing night-soil for manure at as early a day as convenient."

He also inquires about mixing bone charcoal and gypsum with the night-soil:

"I tried this plan once, but did not receive the benefit that I expected, although it perfectly deoderized the night-soil."

Prof. Mapes.—That is not the best way to use bone charcoal—its value is mostly lost unless it is treated with sulphuric acid. The best thing to

deoderize night-soil is charcoal dust. The next best is prepared muck. The next, any fine, dry mold, such as the scrapings of roadsides or fence-corners. It should be thoroughly mixed, frequently stirred, and remain in compost some months before using. There is no better manure than well-prepared night-soil; there is none that will give more unsatisfactory results used in a raw state. At the price at which it is usually obtainable it is also a very cheap manure. It is cheap at five dollars for a horse-cart load, and at that price will bear transportation two or three miles.

Mr. Wm. S. Carpenter.—Barley sprouts is an excellent article used as a top-dressing. I am looking out for fertilizers. There is a great quantity of spoilt salt fish now in this market, the barrels weighing two hundred pounds, and selling at from twenty-five to fifty cents per barrel.

Prof. Mapes.—I should think the barley sprouts a good manure, but the spoilt salt fish is nearly worthless.

Cultivation of the Potato.

Mr. D. A. Bulkeley.—No other crop that the farmer raises has received so little attention as that of the potato. Until within a few years it was thought the potato patch must be in some out of the way place, and on land not fit for any other crop, and quite enough was supposed to be done to the potatoes when the ground was plowed and the seed, such as could not be sold in the market, or fit for the table at home, was put in the ground, without much hoeing, or other attention till harvest, and then a full crop expected,—not so with any other crop. The best seed is selected,—care and attention are bestowed till safely harvested.

Except bread and meat, there is no other article of food that comes into more general use than the potato, or is of more importance,—for it is found daily on the table of all, from the king to the peasant, and in a large portion fills the place of bread, meat, pies and cakes; all animals and the feathered tribe are fond of them, either cooked or raw. I cannot see why the potato is not deserving of more attention.

In the cultivation of the potato, the first requisite is good seed,—diseased or run-out seed makes poor returns, however good the soil, cultivation or season.

Sward newly broken up, of old meadows or pasture, is much the best for potatoes if dry, always avoiding wet, cold clay soils. If manure is used, spread it on top before plowing and turn it under; then it will not affect the potato to cause rot, as by putting in the hill or spreading on the top of the furrows.

Horse manure is the best, that from cattle next, while hog manure is worthless, as it causes the potato to grow to vines. When the land is dry, furrows can be made with a small plow three to three and one-half feet apart, and the seed dropped at eighteen to twenty-six inches, with two pieces to each hill, and a small handful of dry wood ashes, and cover with the plow or hoe.

I plant the seed as it is given me, except the very small ones, using none smaller than a hen's egg, and cut once only and rolling them immediately in plaster, which dries up the new cut and prevents the juice from

wasting, and puts the plaster just where it is needed, and saves the labor of a man or boy when planting of putting it in the hill.

The seed may be cut at any leisure time in winter, and put into barrels or boxes, and be ready for use at planting, and the drying of the seed is a decided advantage to the crop to prevent their rotting.

After the potato is up, so as to be seen in the rows, a light dressing of plaster is useful, and then a cultivator should be run in each row, once or more, to cut up the weeds that may have started, and to loosen up the soil to warm the ground. This is all that is needed till they are up sufficiently to receive a little earth; cultivate again and hoe, after which another dressing of ashes and plaster mixed will fit them for the second hoeing or hilling up, which should be done before they blossom or begin to fall down, as too late hoeing makes small potatoes that don't get ripe.

Potato seed should be changed often, as well as other seeds; some do it every year, others never.

Any person that makes a business of raising potatoes will do well to plant every year a few seed or balls of the potato and raise *new* varieties; it is very troublesome to get potatoes in this way, as it takes many years to do it, but the securing of a good potato will pay for some extra trouble.

A word about keeping potatoes after they are dug, or in the cellar: they should never be exposed to the sun, more than to dry them,—or be bruised more than apples, or be left scattered about, as light and air injure them, —but should be put in barrels or piles and covered up with straw, saw-dust or dry sand. The reason that the potatoes in the cities are so poor is that they are roughly handled and exposed to air and sun, and are only bought as they are wanted for the table, a peck or less at a time; much better get them of some one who grows good ones on dry soil, and keep them covered as above described, and then always have fresh potatoes for the table. I am now raising only three varieties, Bulkeley's seedling, Monitor and Prince of Wales, all of my own originating from the seed. They combine more desirable qualities in my estimation than any others with which I am acquainted. The first named has been widely distributed within the last three years, to the entire satisfaction of all growing or eating them. The other two varieties are newer, and are but just ready for distribution for seed; both are unsurpassed in excellence for the table, the first for boiling, the last for baking. All three produce largely, are of good size, shape and color, ripen seasonably, and are more mealy and proof against the rot than any of the approved varieties with which I am acquainted.

The pen of the theorist has been for years scratching off conjectures about the cause of the potato disease. The hoe of the practical farmer must now take its turn, and with due attention to seed, soil, season and scratching, we shall bring back the old times of bounteous crops with greatly improved varieties.

Mr. William S. Carpenter.—The method detailed in Mr. Bulkeley's paper gives an expensive way of growing potatoes I am successful in growing them upon sod ground, simply plowed once, harrowed, and planted without manure, and when the soil is heavy, covering only three inches deep. I prefer to renew my seed from a distance every year. I cut it, and dry it one day in the sun, which gives the cut part an artificial skin.

I then plant in drills two feet apart, and as soon as the potatoes are up, plow and brush over the ground, and cultivate flat. I never put ashes or plaster *in* the hill, but always on the surface.

Apple-Tree Worms.

Mr. Solomon Beckley, of Montrose, Iowa, writes for information about a worm which is beginning to infest the orchards of that State. He says:

"The worm is about one inch in length when full grown, brown color, moves along by measuring his head forward and drawing up its tail for a new start; attacks the trees about the time they commence blooming, destroying the blossoms and eating the leaves. They come in multitudes. Two years ago we found they had destroyed most of the blossoms, and trimmed the leaves on about twenty-five trees before they had been noticed. We endeavored to stop their progress by rapping on the limbs of the trees with poles; the jar would cause a hundred to fall two feet or so, hanging on a thread like a spider-web; we then swept them off with the pole. They would soon return from the ground to the tree again, to prevent which we put tar about the body of the tree, and, as they gathered about it, we killed them by brushing them with old stiff broom-brushes; a thousand would crawl up in a short time. A few days thus employed destroyed most of them. Last year we kept watch, and, as soon as they appeared, not above a quarter of an inch in length, we began to rap and shake the limbs twice a day for several days. We so effectually headed them off, that no material damage to the fruit was done by them. I have not discovered how they originate; I know not whether any wash applied to the trees will kill the eggs, or destroy them. I should like very much to hear from your Club on the subject; I have read the essay on Entomology, in the Patent Office Report, but am not satisfied that this species is mentioned."

Dr. Trimble thought from the description this must be the measuring-worm, so common on the trees about this city, and, so long as they exist only in moderate quantities, they may be kept under subjection by the plan recommended by the writer of that letter.

Birds and Worms.

Mr. D. A. Barker writes from North Bergen the following letter, which is appropriate to the preceding subject:

"Mr. Robinson: I have read your stand for the birds and against the dogs with interest. I will add my testimony: Fifteen years ago I came on this farm. Every year the orchard caterpillars have troubled us. One year they took every leaf off the trees; we got no apples that year or the next. Last year, the worms were thick enough to eat half the leaves, and then wound their cocoons in the leaves that were left. Now for the birds: About two hundred common blackbirds came and picked out the cocoons, held them with their feet, and picked out the grub and ate it till there was not a cocoon left on the trees, and consequently there were no millers hatched, except a few that were hatched in the fences and crevices, that the birds could not get into. These birds were worth one hundred dollars to me."

What Plants are Hardy in Vermont.

Mrs. E. D. Brown writes from New Haven, Addison county, Vt., as follows:

"I noticed in the discussion of the American Institute Farmers' Club of last week an inquiry from a lady residing in Castleton, Vt., in regard to shrubs and seeds adapted to that section. As I reside only thirty-five miles north of that place, and have devoted some time for the past six or eight years to the cultivation of flowers and shrubs, I will attempt a reply, as far as my experience can testify. I have found that, with good soil and tolerable cultivation, the following shrubs are hardy in lat. 44: Lilacs, syringas, snowberry, currants, Tartarian honeysuckles, fire or burning bush, smoke or fringe tree, flowering almond, rose acacia, American fringe or white spires, privet or prim. Box is not hardy with us, though it thrives well in some localities in this vicinity. Of climbing shrubs, ivy, clematis, honeysuckles (of which I have only three varieties), scarlet monthly, pale-faced early fragrant, and Canada, beside one, said to be a native of this State, which we call rough-leafed woodbine (flowers a beautiful orange); the wistaria and trumpet vine I have seen, but not cultivated, consequently cannot report as to their hardiness. My list of roses is small; what I have succeed well. I have none of the climbers, except the Boursault, which hardly deserves the name. I think most of the bulbs may be successfully cultivated here from what I know of tulips, gladiolas, hyacinths, and lilies; tubers, as peonias and dahlias, do well; the choice varieties of dahlias require care in maturing and keeping through the winter. All the so-called hardy perennials, with a little protection through the winter, give us, away up here, good satisfaction—perhaps because we see nothing better to contrast unfavorably. Annuals, in endless variety, may be grown here, of which perhaps asters and petunias excel. If the lady in Castleton declines Mr. Fuller's proposition, I would be highly gratified to have it transferred to me.

"Success depends much, if not wholly, upon beginning right. I mean preparation of borders, as Dr. Grant would express it. I would recommend to floral amateurs, if they aspire to and expect best results, to read what he says on that subject in the three or four first numbers of Landmarks."

Chiccory.

Mrs. L. B. Coggshall writes to Mr. Solon Robinson as follows:

"You have invited 'letters from the people,' or I should not feel free to trouble you.

"I have something to ask, and something to offer.

"Coffee is so dear that many are using dandelion root, dock root and rye. Chiccory is said to be equal to coffee, but where can we obtain the seed? [At any large city seed store.]

"I always look over the reports of the American Institute Farmers' Club, and there I learned that others had applied to and were likely to get seed from that body."

The same lady writes the following about

"CHEAP BREAD.

"In experimenting for cheap bread, I tried rye flour. My bread was heavy and sticky. I sought information, and found that the dealer had sold me grown or sprouted rye. I then attempted to use up the rye by adding it in with my buckwheat cakes, and liked it. I then stiffened the batter to the right consistency for bread. The result is a light sweet bread. Proportions—Two parts Indian meal, one part buckwheat, one part rye. I set a sponge as for cakes, let it get acid, sweeten with saleratus, stiffen to the right consistency (not stiff enough to mold), and bake immediately." Also,

"HOW TO GET OLD CORKS OUT OF BOTTLES.

"Take a stick of hard wood the size of a goose quill and four or five inches long. Take a piece of brass wire twelve inches long and the size of a number 7 needle; bring the ends of the wire together, and secure them firmly around the stick. When you wish to use it press the loop of wire lightly together and insert it in the neck of the bottle; as soon as it gets beyond the neck it will spring out, giving room to bring the cork to the right position, and then the little piece of elastic wood is at your mercy."

Cultivation of Flax.

This subject is engaging the attention of American farmers to such an extensive degree that we insert the following account furnished by Mr. Stephen M. Allen, agent of the National Fabrilia Company of Boston:

Fabrilia is the name given to a new article for textile fabrics, procured by new, peculiar and patented processes, from various kinds of long, fibrous, vegetable substances, reduced to a short stapled fibril, like cotton and wool, so that the same may be mixed with either of these, or can be spun and woven separately, on either cotton or woolen machinery.

CULTIVATION OF FLAX FOR MAKING FABRILIA.

The flax plant may be grown in almost any climate or soil on the face of the globe; although the constituent elements of the fiber or woody stalk will be somewhat different, on account of changes in either soil or climate. The atmosphere furnishes nearly all the elementary principles of which the fiber consists; therefore, if the woody part of the stalk, and the oil cake from the seed, shall be retained for consumption on the farm, the product will not impoverish the soil more than any other crop.

MOST FAVORABLE CLIMATE.

The districts where the temperature is the most equable will be the most suitable for the growth of flax—where neither severe drought nor excessive moisture prevails. In the event of a long continuance of drought with a hot sun, when the plant has gained a height of but three or four inches, the leaves are unable to protect the soil from the sun, and the roots having penetrated but slightly, are unable to get sufficient moisture, the plant is in great danger of destruction. In such a case it should be watered, if possible. Flax will bear a good deal of moisture, and thrive best in moist climates.

SOIL.

The best soil for flax is a sound, dry, deep loam, with a clay subsoil. The land should be properly drained, for when it is saturated with either

underground or surface water, good flax cannot thrive. Yet the soil ought to be able to retain a moderate moisture. Light clays and alluvial soils will also do well under proper management; but light sandy or gravelly soil, and very strong undrained clay, should be avoided. Flax should not follow crops where much manuring has been done, as it produces many weeds, and the flax fiber grows thin and poor upon the stalk. New grounds produce a strong crop of flax.

PREPARATION OF THE GROUND.

The land should be well drained, the weeds carefully taken from it, and the soil left in a fine, deep, clean state. Then the roots can penetrate into the ground, and they will oftentimes to an extent equal to half the length of the stem above ground. Plow in the autumn, immediately after harvest, across the ridges; leave the land in this state till early spring, then plow again; then give it a thorough harrowing, leaving it in a fine pulverized state, taking care to remove stones and sods. Rolling is then advisable. The surface should be left as smooth as possible, as the crop will then grow more evenly. If the soil is very stiff, one more plowing than above named may be resorted to.

SEED AND SOWING.

Sow seed that is plump, shining and heavy, and of the best brands. Sift it clear of seeds of weeds, for by doing this a great amount of labor in after weeding will be avoided. About two bushels of seed is a fair average to sow per acre. It is better to sow too thick than too thin. The ground being well prepared, sow the seed, giving the ground as equable a supply as possible. After sowing, cover it with a seed harrow, going twice over it—once up and down, and once crosswise; this spreads it more equally, and avoids the small drills made by the teeth of the harrow. Finish with the roller, which covers the seed about an inch; thus giving it a proper depth, and insuring an even germination. Sow nothing with the flax.

The earlier the seed is sown, the more slow and steady the growth, which is desirable, as the fiber is in consequence finer. Later in the season vegetation is more rapid; the fiber grows quicker, and has not time to become fine and mellow.

CARE WHILE GROWING.

Weeds must be carefully pulled when the plant is about three inches high. If there is an appearance of a settled drought, the weeding should be deferred till a later day, as by weeding then the tender roots of the plant would be exposed. To get good seed for future sowing, allow some to fully ripen for the purpose.

MATURITY OF STALK.

The fiber is in the best state before the seed is quite ripe. If it remains longer uncut, the fiber is coarser. The best time for cutting is as the seeds begin to change their color from a green to a pale brown color, and the stalk becomes yellow for nearly or quite two-thirds of its height from the ground, and to lose its leaves. If the fiber is cut too early, it is flimsy; if too late, coarse. So long as the seed is in the husk it continues to ripen. Cutting should only be done in dry weather.

MANNER OF GATHERING.

When properly ripened in the field, the flax may be cut with the ordinary scythe, cradle or mowing machine, and should in all respects be cured the same as hay. It should be placed in the barn, or in stacks in the field, as soon as dry enough after cutting, and should not be exposed to constant dews or rain. It may be threshed by an ordinary threshing machine, as the tangling of the straw is no injury to the fiber for making fibrilia. And when the seed is thus removed, it may be broken on the farm by the brake, needing less power than a thrashing machine, or it may be hauled like hay, to designated spots in the neighborhood where a brake may be permanently worked; and the tow thus cleaned and scutched, may be sent to market to be cottonized at the factories where used. The usual crop of flax per acre is from one to two tons of unrotted straw, and from fifteen to twenty-five bushels of seed.

BREAKING AND SCUTCHING.

The recent improved brakes of the Fibrilia company are prepared for the breaking and cleaning of both long and short line flax or hemp, rotted or unrotted. One machine will do the whole work and can be run by horse-power on the farm, the same as a threshing machine, turning out the fiber ready for steeping, from one to three tons of straw per day, and will cost, according to size, from $250 to $500. One good brake will answer the purpose of a whole neighborhood or town.

The flax straw should be thoroughly dry when broken, and care should be taken that the fiber and shives should be kept separate. As soon as the fiber is properly broken and cleaned by the machine, it should be carefully baled, without being wet, and sent to market, where it is steeped, fibridized and bleached or colored, as required for spinning on short stapled machinery prepared for the purpose. The steeping and fibrilizing process is not usually carried on by the farmer, but more properly belongs to the manufacturer.

GENERAL OBSERVATIONS.

By the foregoing method the roots of the flax are left in the ground, and act as a fertilizer. The shives or woody portion of the stalk, after breaking, if used unrotted, and before the albuminous properties are suffered to ferment, make the best of feed for stock on the farm; and this, in unrotted straw, forming three-quarters of the whole weight of the original straw, is an important item for the consideration of the farmer in estimating the value of his crop. The rotting process heretofore practiced by farmers, which has always been so tedious a part in the culture of flax, is sought to be avoided. In fact, the only value that there can be in rotted above unrotted straw, to the purchasers for the manufactute of fibrilia, is in the great difference in weight, which is about one-third. One ton of unrotted straw, when fully rotted, will only weigh about from twelve to fourteen hundred pounds; the fiber being about the same. It will be seen that the farmer can afford his unrotted straw for one-half the price of rotted, besides saving all the trouble and expense of rotting; therefore, with this allowance, it is better for both the farmer and the manufacturer that the straw should not be rotted. One ton of unrotted straw will produce about 500

pounds of unsteeped fiber, or 400 pounds of pure fibrilia, and will leave about 1,200 pounds of valuable food for stock.

Adjourned. JOHN W. CHAMBERS, *Secretary.*

April 7, 1863.

Mr. Edward Doughty, of Newark, N. J., in the chair.

Strawberries.

Mr. Wm. R. Prince of Flushing, L. I., read the following paper:

It is no trivial affair for an Institution like this, when undertaking to give a tone to public opinion, and to guide industrial enterprise; to treat lightly or carelessly with the prerogative and influence thus assumed. On the accuracy and the justness of your decisions and recommendations, depend the disbursement of countless thousands by the operative and laboring classes devoted to Agricultural and Horticultural pursuits. I hold that as a Society and as Individuals you are in a double sense responsible to the vast public, who look to your recommendations as possessing authority and knowledge, resulting from critical investigation. Having given up all business pursuits to my sons, I intend, as rapidly as my leisure will permit, to analyze the Transactions of the American Institute from the first day of its existence—in so far as its action has related to the various Pomological productions of the world at large, and most especially to those Species and Varieties which are the natural products of our own climate, or which have become acclimated by seminal reproduction.

I have addressed to this Society three Articles which are now being published in your Transactions, viz:

1st. The Grapes of the World—their Species and Varieties.

2d. The Fragaria or Strawberry family.

3d. The Analogy of the Trees and Plants of China, Japan, and North America; and the Great Normal cause of this Similitude.

The subject of my remarks to-day will be confined simply to judicious Selections of Strawberries for Field and Garden Culture.

SELECTIONS OF STRAWBERRIES.

The six Varieties recommended in 1859 by a Committee of this Farmers' Club "for general cultivation," were ranked by them as to value, in the order in which I shall now enumerate them, and in this connection, I desire now to signalize the position they now occupy in the public estimation.

No. 1. *Wilson*—which has proven so miserably sour, of bad color, the berries lying on the ground, producing but one crop and then dying out; insomuch that it is now almost universally abandoned.

No. 2. *Longworth's Prolific.*—A poor bearer, with few fruit stalks and blossoms, runs to foilage. There has never been a basket of the fruit sold in Cincinnati where it originated.

No. 3. *Hooker.*—A poor bearer, too soft for market, plant tender, often winter killed.

No. 4. *McAvoy's Superior.*—Moderate bearer, too tender and juicy to bear carriage to market, defective in ordinary fertilization.

No. 5. *Hovey.*—A large and very fair berry, not of high flavor, and declared to be very unproductive at Rochester and other localities.

No. 6. *Burr's Pine.*—Quite small, poor bearer, weak, miserable grower, plant tender.

Here are the six varieties which Your Committee selected (three of which Committee had Strawberry plants for sale), and as they had more plants of the Wilson to sell than of any other variety, it was quite rational that their admiration should fix upon that as No. 1. I analyzed this selection and demonstrated their failure at the time, but there were few persons on the Committee competent to make a judicious selection, and Prof. Huntsman, the best informed on the subject, told me afterwards that his opinions stood no chance of adoption.

At the present time no intelligent Fragarian would dare to recommend more than one of these six Varieties for *general cultivation* and that one has defects; and as a consequence of these injudicious selections, the Market growers have lost four years' time, and have now to begin anew in their labors.

I notice that the "Fruit Growers' Club," which seems to be comprised of many of the same gentlemen who assemble here, together with some who know far less of Horticulture and Pomology, have recently recommended "Six varieties for general cultivation." I should be glad to always see published with such Reports, the names of the Committee that recommended them.

The following comprise their list:

No. 1, Triomphe de Gand, a Pine variety that is *very prolific in plants;* and therefore the most profitable to the Nurseryman, but one of the meanest and least productive of its class as to fruit. Being better than the sour Wilson and the ordinary Scarlets, and very large, the persons whose knowledge has been confined to such only, give to it their approval, although it possesses neither sweetness nor perfume, and will never produce over one-third the quantity per acre that the prolific varieties will yield. Why, Sir, it is recorded in your Transactions for 1861, page 98, that Mr. Fuller stated here that this plant would produce four hundred bushels to the acre. He also said he believed that twice as many Strawberries could be raised upon an acre as of Potatoes, and as we know that four hundred bushels of Potatoes have been raised, this would make the product of Strawberries eight hundred bushels to the acre. He further said that he could raise six hundred bushels to the acre, *and had raised at that rate!* Now, Sir, I defy the proof that one hundred bushels of the Triomphe de Gand were ever grown on an acre, or that three hundred bushels of any kind of Strawberry were ever produced on an acre. These statements are utter delusions! The Triomphe de Gand like the Wilson throws out a mass of blossoms two-thirds of which never perfect a berry. On the Triomphe the berries ripen gradually, very few at a time, thus enhancing the expense by numerous pickings. It must be grown in hills, on rich soil, and with much more expense than the Scarlet and Iowa varieties. Persons who are ignorant of the best Pines cling to this inferior variety, but their further experience will

cause it to be cast off, and such superior varieties as Lúcas, Marguerite, Delices du palais, Orb, Lorio, Emma, Rietmeyer, Comtesse de Beaumont, and others will be adopted. It is true that there is a heavy stock of plants of the Triomphe de Gand yet on hand, which it is desirable to push off before the public are fully informed as to the superior varieties.

No. 2. *Bartlett.*—Who had the assurance to recommend this plant for general cultivation? It is an old Massachusetts variety called Boston Pine, totally rejected there except as a fertilizer of the Hovey. If grown after the usual field culture, it is utterly worthless for its barrenness, and does not produce one berry to six blossoms. I threw it on the dunghill and Mr. Cadness of Flushing did the same, and said it ought to be publicly denounced, and a multitude of others will tell you of its worthlessness for field culture.

Why is it that this old exploded variety should have been palmed upon the public as a new seedling? Mr. Fuller acknowledged to me that it was not a new seedling, but that he found it in Mr. Bartlett's garden. Whoever plants this barren Pine variety for field culture, will have full cause to remember the man that recommended it. It was denounced at the Pomological Convention of 1860 by Mr. W. C. Strong and other Strawberry growers of Brighton, Mass., the place where the plant originated, and has been an outcast for the last ten years. At the National Pomological Convention at Boston in September last, the only question about it was, whether it is the Boston Pine or the Brighton Pine, both of which are worthless for field culture. The President, Marshall P. Wilder, said he had not yet decided on this point. Mr. Hovey denounced it, even Mr. Knox now declares it is the old Boston Pine which is the parent of the Brighton Pine.

No. 3. *Wilson.*—The day for this miserable apology for the Strawberry family has gone by, and its culture is nearly abandoned. Even Mr. Knox who lauded it to the skies has plowed it up, and the plants can no longer be sold for anything.

No. 4. *La Constante.*—To this variety I cannot object, if the Pines are to be adopted for field culture. It is one of the best, but can only be successfully grown in hills and by special cultivation, yes it is vastly in advance of the Triomphe de Gand.

No. 5. *Cutter.*—This is a fair berry, rather large, of acid flavor, and bears a fair crop for a hermaphrodite, which sexual class as a general rule produces about two-thirds the quantity per acre that is realized from the productive pistillates.

No. 6. *Newland's Seedling,* or *Pyramidal Chili.*—I am quite amused at seeing this old variety resurrected. I was the only person that called it "Newland" and so named it in my last Catalogue, not because it is a seedling, as it is not so, but to prevent confusion. Mr. Newland, of Palmyra, obtained this variety long since from a man who declared he received it direct from Chili. But as I saw at once that it was a variety of the Virginiana family, I wrote Mr. Newland to that effect, and that I should call it by his name to prevent its being confused with the true Chili varieties. It is a good berry, rather large, and fairly productive for one of the hermaphrodite class, sweet, juicy, firm flesh.

Here we have Six Varieties, whose names are sent forth to the nation

with seeming knowledge and authority, of which it may be most positively asserted, that not one of them is a fair representative of the present advanced stage of the Strawberry culture, or can be deemed *the most profitable for market culture, or for general cultivation.* And I will guarantee that if Prof. Huntsman (the closest observer of all our amateurs) is appealed to, he will corroborate my statement.

Like the unfortunate Report of the Committee of 1859, this selection will be laughed at by every well informed cultivator, and like to the varieties then recommended, these six will also sink into a consequent oblivion, but not until thousands of dollars shall have been spent by the deluded market growers. In the proceedings at the "Fruit Growers' Club" I have noticed that one member recommended that the Bonte St. Julien be one of the Six, but another member objected to it as "so small a berry," whereas it is larger than three of the varieties actually selected, far more beautiful than the Triomphe de Gand, very sweet, of fine flavor and perfumed. Mr. Williams there remarked that the Austin is superior to the Wilson, but neither of these is eaten by Amateurs and even the Cat birds pass by them with evident disgust. One member recommended the Fillmore, a very large showy berry, but without sweetness, the most insipid of all and also has a large core. Mr. Fuller spoke well of the miserable Fillmore, but stated he would not recommend a Pistillate plant for general cultivation. What ignorance and obstinacy! He has denied that Pistillates are found in a state of nature, and declared that they are garden monstrosities, when there is not a schoolboy in all our Yankee land that cannot find plenty of them in five minutes in any forest, and when Downing, Wm. Prince, Kendrick, Longworth, Hovey, Thomas, Elliott and Hooper in their several works, and everybody else that knows anything, have recognized the Pistillate equally with the Hermaphrodite varieties as belonging to every North American Species of the Fragaria family. I am prepared to prove at a favorable opportunity that God and Nature are not guilty of any stupid failures, and that a female plant of the Vegetable Kingdom is specially constituted for reproduction, and most pre-eminently so, with the same unerring wisdom and perfection as is so plainly dilineated in the Animal Kingdom. I am ready to prove that Pistillate varieties are the only ones which can be relied upon for the most abundant crops, and that their normal character is such, that there can be no possible failure, but that they must necessarily produce fifty per cent. greater crops per acre, than the most prolific Hermaphrodite can by any possibility yield.

As the Strawberry culture is now attaining to a vast development, it is as I have already stated, no trifling matter to mislead a confiding public, which looks to our different Pomological Societies for truthful and reliable information. This Association, a branch of the American Institute, imparts no temporary flickering flame, but it stands pre-eminent in our Land for the permanent advancement of all great National Objects. It has fostered American Industry and American Intellect in the development and advancement of all the ennobling pursuits, which impart prosperity and happiness to the great human family. And I trust that as in the past, so in the future, it will in every respect prove true to its great and mightily important mission. And as it has ever been sustained in its career by

many of the noblest and most enlightened minds of the Nation, I trust that in the future its march will ever be onward, aided, sustained, and perpetuated by the accumulation of intellectual minds, which would appear to be ever on the increase, and ever shedding new light and new radiance on all the Sciences and Arts beneficial to humanity.

We are now aware that the Strawberry Report we sent forth in 1859 has proven an entire failure, and the public were misled by its erroneous recommendation of varieties which experience has now repudiated. I trust that we shall in future adopt such a course as will render impossible any similar failure by the Selection of a Committee fully competent to perform its duty to the public.

I hope that we shall not act precipitately by undertaking now to forestall public opinion so as to operate on the Spring sale of plants, but that we shall allow full time for a thorough examination of the products of the ensuing Strawberry crop, and that the Committee we may appoint shall make their Report after the fruiting season is past.

Mr. Wm. R. Prince recommends to the members of the Farmers' Club, American Institute, the two following Lists:

SIX BEST VARIETIES FOR MARKET CULTURE AND FOR GENERAL CULTIVATION.

Welcome.—The earliest berry, combining size, flavor, fine color, firmness, cleanness and freedom from rot; separates readily from the hull, very productive, every flower a fruit, and is a sexual anomaly, combining hermaphrodite and pistillate flowers on the same plant.

Scarlet Magnate.—Largest and heaviest of all North American varieties, and the most firm and solid. It must have the Ophelia as a fertilizer.

Diadem.—Very large, pleasant flavor, beautiful, produces more than the Wilson.

Stewart.—Comprises, with the Suprema, nine-tenths of the Strawberry farms of Maryland.

Sempronia.—Large, sprightly flavor, very productive.

Late Globe.—Large, bright scarlet, sprightly acid, valuable for late market crop.

TEN BEST VARIETIES FOR AMATEURS.

Lucas (De Jonghe).—The climax of all the Belgian Varieties, very large, beautiful, glossy crimson, sweet, aromatic, extremely rich, plant vigorous, with large, broad, deep green foliage.

Delices du Palais.—Round, bright scarlet, firm, juicy, sweet, highly perfumed, delicious; plant hardy, with vigorous foliage.

Auguste Rietmeyer (De Jonghe).—A Belgian variety, very large, ovate, vermilion, flesh salmon, exquisitely sweet, foliage large, deep green and vigorous.

Duchesse de Beaumont.—Very large, bright glossy scarlet, flesh rosy, sweet, juicy, highly flavored; plant vigorous, very productive.

Eureka (Prince).—Large, conical, light scarlet, beautiful, firm, sweet, very juicy, high flavor, excellent; plant very vigorous, hardy, and exceedingly productive; the highest in quality of all the North American varieties

Ornement des tables.—Large, very beautiful, bright orange scarlet, flesh salmon, firm, sweet, juicy, deliciously perfumed; plant vigorous, productive.

Frogmore Late Pine.—Superior to all other late Strawberries, monstrous, brilliant crimson, juicy, rich, perfumed, very beautiful.

Lennig's White Pineapple.—White with rosy tinge, very large, beautiful, buttery, high flavor, plant very vigorous and as hardy as the Common Scarlets.

Bijou des Fraises.—A large and most exquisite variety of the Hautbois family, which is classed as the "real Amateur's Strawberry."

Welcome.—See description in the preceding selection.

Mr. John G. Bergen.—I am perfectly satisfied by Mr. Prince's denunciations of the committee of 1859 which made up the list of strawberries then recommended by this Club. I was a member of that committee; I thought the list a good one. I did not pretend to know that it was the best; I think it might be better. I leave it to others to decide whether Mr. Prince has improved it. I am glad to find one improvement in Mr. Prince himself. He has heretofore always contended for the pistillates, arguing that no other variety could by any possible means be equally prolific. Now he argues in favor of the hermaphrodite plants, and one single fact entirely upsets his pistillate theory: and that is, that the Wilson Seedling, which is a hermaphrodite, is the most prolific variety ever known.

Mr. Carpenter.—The public have decided this question about pistillates. The Wilson and Triomphe de Gand are the two most popular varieties of strawberries in cultivation. Say what you will about the quality of the Wilson—call it sour, bitter, unproductive, unfit for cultivation, and all the hard names that Mr. Prince can find in his vocabulary, it is all of no avail—people do and will cultivate it; and it has done more to spread the strawberry culture than all the varieties which Mr. Prince has named; several of which are almost entirely unknown, only one, La Constant, which can be highly recommended, while the Diadem and Scarlet Magnate have been generally discarded.

Mr. Prince.—In Philadelphia the Wilson and Diadem side by side, the Wilson would not bring half the price of the Diadem, and it yields fifty per cent. greater crop on account of its being a pistillate. I have never varied my opinion as to the superiority of the pistillates in the crop. Mr. Bergen has misunderstood me. Mr. Carpenter's statement as to the Diadem and Scarlet Magnate are entirely erroneous.

Mr. Prince then submitted the following:

SELECTIONS OF PEARS FOR ONE HUNDRED TREES, FOR ORCHARD OR MARKET CULTURE.

		Period of Maturity.
3	Jargonelle (English)	July 25 to Aug. 10.
4	Beurre Giffard	Middle of August.
6	Moore's Pound, largest of early pears	Last of August.
3	Tyson	Aug. 25 to Sep. 10.
3	Bartlett, on pear or thorn	Throughout September.
4	Flemish Beauty	Last of September.
4	Fondante d'Automne, or Belle Lucrative	Last of September.
4	Bergen, extra	Sep. 20 to Oct. 10.
4	Doyenné Boussouck	September and October.
4	Louise Bonne de Jersey	September and October.
4	Paradise d'Automne	September and October.
4	Beurré Superfin	All of October.
4	Duchesse d'Angouleme, on quince	October.
4	Sheldon	October.

		Period of Maturity.
4	Beurre d'Anjou	October and November.
3	Urbaniste	October and November.
4	Beurré Diel	October to December.
4	Beurre Clairgeau	October to January.
3	Glout Morceau	December.
6	Lawrence	December and January.
4	Vicar of Winkfield	December and January.
4	Prince's St. Germain	December to March.
4	Doyenné d'Alençon	December to April.
4	Pound or Uvedale's St. Germain, a highly productive cooking pear	January to April.

N. B.—Some persons may prefer for profit the Buffum to the Urbaniste, as it produces crops much sooner, but it is not equal in quality.

ONE HUNDRED TREES FOR AMATEURS.

		Period of Maturity.
2	Madeleine	July 15 to July 30.
2	Jargonelle (English)	July 25 to August 10.
2	Bloodgood	July 25 to August 10.
2	Doyenné d'Eté	Last of July.
3	Giffard	Middle of August.
3	Ott, flavor of Seckel	Middle of August.
3	Moore's Pound, largest of early pears	Last of August.
3	Rostiezer	Aug. 15 to Sep. 10.
3	Tyson	Middle of September.
3	Rhenish Colmar, spicy flavor	Middle of September.
4	Hegeman, flavor of Seckel	Middle of September.
4	Bartlett	Throughout September.
4	Flemish Beauty	Last of September.
4	Fondante d'Automne, or Belle Lucrative	Last of September.
4	Bergen, extra	Sep. 20 to Oct. 10.
3	Doyenné Boussouck	September and October.
4	Louise Bonne de Jersey	September and October.
4	Paradise d'Automne	September and October.
3	Seckel	September and October.
3	Beurre Superfin	All of October.
4	Sheldon	October.
3	Beurre d'Anjou	October and November.
3	Urbaniste	October and November.
3	General Taylor, extra	November.
4	Beurre Diel	October to December.
2	Beurre Clairgeau	October to January.
3	Glout Morceau	December.
4	Lawrence	December and January.
4	Prince's St. Germain	December to March.
3	Winter Nelis	Dec. 15 to Jan. 15.
4	Doyenné d'Alençon	December to April.

Note—Pears budded on the Cratægus cordata, a vigorous species of hawthorn, are more hardy than on the pear or quince stock, and form medium standards attaining a height of 30 feet, which is quite sufficient for all useful purposes. They come much sooner into bearing than standards on the pear stock, and occupy the same intermediate position as apples on the Doucin stock, and cherries on the Mahaleb stock.

Mr. William S. Carpenter.—Mr. Prince does not include the Doyenné d'Été, which is a far better pear than the Madeleine, which is only a third-rate pear, and, although a strong grower, is apt to blight, particularly at the West, while the Doyenné is very hardy and a great bearer.

Mr. Prince replied that the Doyenné is too small for a market pear, and that the Madeleine is ten days earlier.

Mr. John G. Bergen.—I cannot agree with Mr. Prince in this. I do agree with Mr. Carpenter, after having tried both sorts. The list is a very good one for one who wants a great assortment, though I think it might have

been improved. It is lacking in one very essential particular; it does not name the pears in the order of their excellence nor time of ripening.

Mr. Prince replied that he supposed he was talking to a company of enlightened pomologists, or at least to those who are able to consult Downing's or some other fruit book, for the description, quality and time of ripening of the sorts named.

Mr. Solon Robinson.—Mr. Prince forgets that if I should print this list in *The Tribune* it might be read by 400,000 persons, who would not have it in their power to consult Downing or any other standard author upon this subject.

Mr. Prince.—Then I will take the list and revise it as suggested, and furnish it for publication, and I believe it will be the best ever printed.

Mr. Carpenter.—Not while it rejects the Beurré Bosc, which is certainly one of the best and most profitable winter pears grown.

Dr. Trimble.—Yes, if grown upon Jersey soil. There's no mistake in that. It is one of the most thrifty trees, one of the most productive, and should be upon all lists of pears recommended for general cultivation.

Mr. Prince replied that the gentlemen were entirely mistaken; that it is not the Beurré Bosc that they were describing, but the Paradise d'Automne, which is a good, thrifty variety, while the Beurré Bosc is utterly worthless for its scrubby growth.

Mr. John G. Bergen.—There is another little difficulty in the list. Mr. Prince recommends the Jargonelle. I should like to know what he means by that, as the only pear known in this country as the Jargonelle, that is worthy of cultivation, is the Windsor or Summer Bell. There are two others called Jargonelle—one English and one French—but I would not recommend either for general cultivation.

Mr. Prince disputed this point—said the Windsor was an old rejected sort; was only fit to grow for a cooking pear, while the true Jargonelle is one of the handsomest and best grown.

Mr. Bergen.—But which of the Jargonelles do you recommend? There is certainly great difference of opinion about which is which, and the public need to be enlightened.

Dr. Grant.—There is another pear which is not named on this list, which should be upon every one, great or small. This is the Rostiezer, which is one of the best late summer or autumn pears known to pomologists. Its flesh is juicy, melting, somewhat buttery, exceedingly sugary, vinous, aromatic, and pleasantly perfumed.

Mr. Prince.—After the remarks made, I will make a few corrections to my list before handing it to the Secretary.

The Grape.

Mr. W. R. Prince.—I have made a selection of the hardiest and earliest table grapes, suitable for the most northern sections of our country, all of which are of the indigenous American species.

Albino.—Bronzed white, medium size, very good flavor, much esteemed.

Alvey or Hager.—Black, medium size, excellent quality, very estimable.

August Coral.—Full medium size, bright red, honeyed sweet, one of the earliest, much valued, cluster small, but an immense crop.

Black Imperial.—Very large, extremely sweet, somewhat foxy, but melting at maturity, earliest of black grapes, hangs long and improves.

Braddock.—Rather large, purplish, sweet, very good flavor, quite early.

Carter's Virginian.—Medium size, purple, vinous, pleasant flavor.

Catawissa or Creveling.—Large, black, fine flavor, one of the best early market grapes, very superior to Adirondac.

Coriell.—Large, purple, excellent flavor, superior to Isabella, and ripens earlier; an important acquisition.

Concord.—Large, black, very good, hangs long.

Franklin.—Medium size, dark blue, early, sweet, very good flavor.

Hartford Prolific.—Black, large, very early, fine quality, but inferior to several others that are equally early, apt to drop at maturity.

Louisa.—Dark purple, size and quality similar to Isabella, ripens ten days earlier.

Logan.—Rather large, dark purple, very early, good quality, the vine less vigorous than most others.

Mary Ann.—Large, black, very good flavor, very early.

Narcissa.—Large, dark, a magnificent berry, very sweet, more musky and delicious than the Isabella, its parent.

North America.—Large, black, early, sweet, excellent flavor.

Osmond.—Medium size, dark, very good flavor.

St. Catharine.—Large, purplish red, sweet, sub-acid, sprightly flavor, delicious.

Taylor's Bullitt.—Small, white, early, sweet, fine, flavor of Chassalas; its size is objectionable.

Troy Hamburgh.—Large, dark purple; appearance, flavor and quality similar to Isabella, and nearly equal, ripens much earlier, and the vine more hardy and robust, amazingly productive, has borne twenty bushels to a vine.

Warren's Catawba.—White, bronzed next the sun, very sweet, slight aroma, superior to Isabella and Concord, hangs long and improves.

White Globe.—Bronzed white, rather large, very sweet, musky, good flavor, hangs long on the vine.

Wyoming.—Medium, dark blue, very early, sweet, pleasant flavor.

York Madeira.—Medium, black, very early, sweet, juicy, vinous, pleasant flavor.

We omit Norton's Virginia, Clinton and some others, which, although very hardy and early, are not equal in quality of fruit, being better suited for wine than for the dessert.

Caution to Grafters.

A letter from Providence, R. I., gives the following important information (if true) to persons setting grafts. The writer says:

"I will state a fact long known to me (perhaps as well known to others), viz: that persons while making the incision for the graft, frequently hold the slip or bud between the lips or in the mouth, and if by so doing one particle of spittle comes in contact with any cut part of the bud or slip, it will not live nor grow. If any gardener doubts the above, let him try the experiment. If you think the above worthy of consideration, please read this letter to your Club at its next meeting."

Osier Willow.

Mr. Isaac Trombly, of Lee county, Ill., thinks osier would be a profitable crop, if it were not for the expense of peeling by hand, and wants some member of the Club to inform him whether there is a machine for the purpose, and where it can be obtained.

Mr. Solon Robinson replied.—There is such a machine, which does the work cheaply and effectually, and if the patentees of the machine contrived for peeling osiers were possessed of a particle of business acumen, they would not only let Mr. Trombly know, but all the rest of mankind, where such machines could be obtained.

Is Mule-Breeding Profitable?

Mr. Wm. E. Haughton, of Fulton county, Ohio, wants to know if mule-breeding would be profitable. If he is a man or ordinary intelligence he might have discovered that it is so, and is extensively practiced in Kentucky, Tennessee, and nearly all the States adjoining. Fine thorough bred mares, and jacks worth $1,000 each, are used, but the progeny brings such high prices that the business is profitable.

The Potato Disease—Once More.

Mr. Solon Robinson.—I do not know which would be the greatest affliction upon the country, the potato rot or the printing of all that has been written upon the subject. Here is a letter from Mr. J. R. Plumb, Fulton, Jackson county, Iowa, one of the thirty Fultons with which the country is blessed, covering three mortal long pages, and undoubtedly containing a sovereign remedy for the disease. I have not read it, and if I should, and it contained ever so much valuable information, I would not print it; first, because it is written upon both sides of the paper—will correspondents take a hint from this? Secondly, because I have done printing matter that is as effete as the disease itself. I therefore bequeath the letter, with many thanks to the writer for his good intentions, to any member of the Club who will undertake the task of reading it, which I am unable to do until my eyesight improves.

Apple Pomace for Manure.

Mr. John F. King, of Olcott, Niagara county, N. Y., writes: "What will be the best way to dispose of a quantity of apple pomace? Some of it has lain for three years, and been worked over by hogs. Is it worth anything for manure? I should like to hear the opinion of the Club."

Here it is in brief:

Mr. Solon Robinson said he would not give sixpence a load unless to use in a compost heap to produce fermentation. The most of the manurial value is in the straw.

Mr. John G. Bergen.—I have had a good deal of experience with pomace. We used to make a great deal of cider, and preferred to throw away the pomace and buy manure; yet I believe after it has lain, as this man describes, till the acid is gone off, it has some value, but not enough to pay for hauling a long distance. On some soils it may be good manure.

Prof. Mapes.—Not unless the acetic acid is neutralized—it is not beneficial to any soil, and to some would be very injurious. I think the most of the manurial value is in the seeds. None of the Jersey farmers esteem it.

Dr. Trimble.—My observation leads me to the conclusion that the most of the manurial value comes from the droppings of the hogs that have rooted over the pomace in search of apple seeds. I do not believe that new pomace is worth anything whatever for manure.

Native Fruits in Wisconsin.

Mr. David R. Beal, of New Richmond, St. Croix county, Wis., thinks that some of the native fruits of that State are well worthy of cultivation, and ought to be collected and experimented upon. He says: "Of the cherry, there is a species growing here wild on bushes, but little larger than currant bushes; the bush resembles the flowering almond very much, and blossoms in the same way—that is, along the whole length of the branch. The fruit is very large for wild fruit, about the size of the ox-heart; flavor somewhat like the choke cherry, but not so astringent; ripens in August, color, black."

Mr. Prince said that this fruit is really a plum, and not a cherry.

Mr. Beal writes further:

"I have planted some pits from these cherries, which came up and are doing well. I also transplanted some, which are likewise doing well. They would be easy to propagate by layers, as I see that where a branch happens to be lying on the ground, it readily takes root. Now, if you would like to procure seed or plants from said trees or shrubs, I will be happy to forward them to you. Of the plums, the best way to begin a course of cultivation would be to procure seed from the best and then plant, and select the best, destroying the poor, so that the pollen shall mix with none but good varieties, or plant in close proximity to excellent known varieties, so that the pollen may mix. But we cannot experiment in that way here, as the plum will not succeed with us, on account of our winters, which are too dry."

Mr. Beal also sent two specimens of fibrous plants called Indian hemp, which Mr. Prince says is the Apocynum cannabinum and Apocynum androsæmifolium—both perennials that may be mown annually, and perhaps may prove valuable acquisitions.

How to Keep Grapes.

Mr. Solon Robinson read the following letter from Mr. Samuel Mitchel, Cameron Mills, Steuben county, March 30:

"I send you a few Isabella grapes, which you will oblige me by presenting to the Farmers' Club as a sample of the length of time this fruit will keep perfect when properly cared for. They were put up in boxes one foot square and six inches deep, containing three layers of grapes with sheets of common newspaper between. They were packed as they were picked from the vines, and placed in a cool cellar, and not opened until this spring, when they appeared almost as fresh as when first picked. You will perceive that most of the stems are yet fresh and green, and the

berries plump and full. I also send you one small cluster of Delaware, as an evidence that there is an entire missapprehension of its keeping qualities, most fruit growers seeming to think that from its thin skin it would not keep well. They are a good deal shriveled on account of there being but a few clusters in the box in which they were kept. I think grapes will keep longer when not left on the vines until the stem is dry and shriveled."

These grapes were in fine condition.

Adjourned. JOHN W. CHAMBERS, *Secretary*.

April 14, 1863.

Mr. Martin E. Thompson, of New York, in the chair.

Poppy Seed.

Mr. G. R. Stork, Coventryville, Chenango county, N. Y., offers the Vermont lady who inquired for seed of the opium poppy, enough to plant an acre free, if she sends a prepaid envelope, provided that she will give the result of her experiment to the public through the Farmers' Club, at the close of the first year's trial. "I also send for distribution among the members of the Club, and any others that may desire to plant them, a package of what is called the Opium poppy seed. On suitable soil the growth is rank, and it requires room—rows of three feet apart and eighteen inches in the row, The yield of opium is greater than any other poppy that I have ever seen, and the blossom is the perfection of beauty in the floral department. Sow early, as the frost does not hurt the young plants; and then for fall blossoming sow again from 1st to 15th July."

Mr. Le Roy Whitford, of Harmony, Chautauqua county, N. Y., thinks the Club do well to caution farmers against many humbugs, such as producing two kinds of potatoes from the halves of two different varieties joined together in the hill; or sweet and sour apples by splitting a bud of each sort and joining them together, and many other similar foolish things. He says: "Every thinking farmer knows that these 'harmless sells,' as they are sometimes called, tend directly to make us suspicious of every innovation, and as therefore a strong brake applied to the wheels of progress, while that vehicle is lumbering and miring in the old ruts of time-honored usage. Good by to the days of wooden plows, reaping hooks, and common fruit, for this is the age of steam plows, horse reapers, and grafted potatoes."

Manure for Potatoes.

Mr. Josiah Spalding of Janesville, Wisconsin, formerly of New Hampshire, an old farmer, over seventy years of age, sends the following as his experience in potato culture:

"Any quantity of plaster of Paris (gypsum) you wish to use, saturated with urine thoroughly, after the urine has become putrid or stale; then add unleached ashes equal to the quantity of plaster; then common sand

or earth sufficient to make convenient to apply. Less than one gill of this mixture to each hill, has about trebled my crop of potatoes when applied."

Mr. S. O. Cross, Sandy Hill, Washington county, N. Y., recommends sawdust as an excellent manure for potatoes. He says: "Prepare the ground as usual, drop the potatoes, and cover with sawdust from one-half to a shovel full in a hill, cover them slightly with earth, after which follow your old custom, and I will warrant sound potatoes in every hill so treated."

Prof. Mapes thinks muck—salt or fresh—would be much better than sawdust, and one of the reasons why it is good, he supposes, is because it contains a large per centage of potash, which in any form will increase the crop of potatoes. Crops of four to five hundred bushels of potatoes have been grown upon the Newark meadow, where the ground is a mass of salt muck. He should doubt the value of sawdust as a manure, though it would be beneficial in clayey soils, to render them more open, so as to receive the benefit of the air. It is well known that potatoes will produce a good crop, if the seed is laid upon the surface of well-prepared ground, and covered with old hay, straw, or any substance that excludes the light. The roots penetrate the soil, and the tubers form upon the surface.

A sensible old Quaker farmer of Salem, N. J., sends us the following as one of his experiments with potatoes: "Some years ago we hauled out some manure in compost in a grass field. Subsequently we hauled it all away but about two loads. This we suffered to rot until it became very fine; then we spread it around as far as we could throw it with a shovel. We planted with corn the next year, and the next with potatoes, without manure. The field of potatoes was clear of disease except the small spot on which we spread the fine compost manure nearly two years before, and on that part the potatoes were larger, but we did not find one clear of the disease."

He also addressed the following interesting letter, upon several other subjects, to the American Institute Farmers' Club.

"SOWING CLOVER SEED.

"A correspondent writing from the West a few weeks ago, recommended growing clover seed on oat ground, as the most certain mode to get the land well set in clover—that the seed will nearly all grow, etc.

"We have sown clover on our oat ground many times within the last twenty years for green crops, to turn under for wheat. When the weather has been dry we have rolled the ground after seeding. The seed sown has germinated and grown well until the oats shaded the ground completely, when the young clover died out, so that the stand has been much less at harvest time on the oats than on the wheat field. May not this be fairly attributed to the broader leaves, thicker straw, and more luxuriant growth of the oats? This is an evidence that vegetation needs the direct rays of the sun to sustain life.

"TURNING UNDER GREEN CROPS FOR MANURE—SOME KINDS WORTHLESS.

"We have plowed under crops of clover for crops of wheat at various times, and always with good results; but have received more benefit from the first crop turned under green, than from both crops turned under when dry. I prefer the green crop of clover to any other dressing for wheat.

"In the summer of 1849 we rolled down and plowed under one acre of oats, when in the milky state, for manure for wheat. On this we sowed two bushels of broom corn seed, and harrowed well. When the broom corn attained an average height of five feet, and as thick on the ground as it could possibly grow to advantage—perhaps ten tons or more to the acre—we plowed them under, too, and sowed wheat. On adjoining land in the same field we cut the oats when ripe, 50 bushels per acre, and hauled all off except the stubble. This we plowed under without manure or fertilizer of any kind, and sowed with wheat at the same time as the other. At harvest time, the land without manure or fertilizers of any kind had more and better wheat on it, and larger straw, than the land with the two green crops turned under. We have tried the oat crop alone with the same result. Since that time there has been no perceptible difference in the crops on the two pieces of land, and both have been treated alike. The land had been covered previously with 400 bushels per acre of soft, friable limestone, containing 75 per cent. carbonate of lime, and intermingled with grains of green sand found on the premises. One week of dry weather followed the plowing under of the oats, which was succeeded by heavy rains and fine growing weather. Many of the oats must have ripened during the week of dry weather, and then remained sound during the six or eight weeks of wet weather which followed, for, when plowing them up, many grew until killed by the frosts of winter.

"PLANT LICE INJURIOUS TO THE OAT CROP.

"Soon after our oats headed, last summer, we found, in spots, about our fields, great quantities of plant lice attached to the lower ends of the grains—in many places so numerous as to change the color of the heads to a dirty or dingy red. We found them in all stages of growth on the same grain toward harvest. Early-sown oats and those on higher land fared the best. They remained attached to the grains until the straw was cut, when the cradles and other implements used in gathering them were gummed with the aphides mashed in the operation. The stench rising from our fields in the evening, just before harvest, caused by these aphides, was sickening. Our crop does not weigh over twenty pounds to the bushel. The oldest inhabitant here does not remember the like. Can you give any information of a like occurrence?

"SUBSOILING NO ADVANTAGE TO SOME LANDS.

"On the recommendation of scientific farmers, I purchased a subsoil plow in the winter of 1847, and subsoiled, that year, 30 acres for corn, leaving a strip of about one rod in width through the middle not subsoiled. The difference in the crop that year, if any, was in favor of the strip not subsoiled. We have seen no difference in the crops since that time. The subsoil was a stiff, yellow clay. That was the first and last of my subsoiling. On deep plowing, for improving lands for grain and grass crops, permit me to offer the following suggestions: If the natural inclination of the roots of our grain and grass crops is downward into the subsoil, to luxuriate there, away from the warming and vivifying influence of the sun—the dews and gentle rains; and if a soil containing a small per cent. of vegetable matter, because deeper, is preferable to one containing twice

that quantity, and will withstand more dry weather—then deep plowing and subsoiling may be needful, may be scientific. But if, on the other hand, the roots of the grain and grass crops do naturally incline to the surface of the ground, where only the warming and vivifying influence of the sun, and the gases carried down by the dews and gentle rains, can effectually reach them; and if a soil containing a large per cent. of vegetable matter is preferable, and will hold moisture better than one containing a much less per cent—then deep plowing and subsoiling are not needful—are not scientific—unless the subsoil is richer in the elements needed by the plant than the soil itself.

"COTTON—THE NUMBER OF SEEDS AND PLANTS TO THE ACRE.

"According to the authorities quoted in the Farmers' and Planters' Encyclopædia, on the cultivation of cotton, one bushel of seed per acre is the usual quantity planted in the cotton States, where seed is plenty and cheap. When they consider the plants out of danger, they thin it with the hoe to from six to twenty-four inches apart. But as no person would recommend leaving the plants closer than a foot in the row where the land is good, and adapted to the plant, and the rows three feet apart—this would require less than 15,000 plants per acre. I have received from the Patent Office several bushels of cotton seed, weighing 26 pounds to the bushel, and, in numbers, 4,000 seed to the pound. If 15,000 plants are all that can grow on an acre to advantage, 20,000 seed, if good, will suffice to plant that acre, or one bushel to five acres will be sufficient, where the seed is scarce.

"GRAPES.

"Of ten leading varieties of grapes, fruited here last year, they all blighted more or less, except the Delaware and Rebecca, which ripened their fruit perfectly. They and the Diana were very superior. The Elsinborough (not Elsinborg, as the fruit-growers have it) is considered here, where it originated, by some, as good as any other grape. Downing's description of it is good, but he calls it Elsinborg, and says it originated in a village of that name in Salem county. I resided in Elsinborough township above forty years ago, near by where the grape originated, and can say there is no such village there, and never has been. It was formerly called the Smart grape here, after the originator, but as the original vine and the family have been gone many years, it is now universally called here the Elsinborough grape.

"Prince says *positively* in the late pomological discussions: 'In California, naturally, there is no good grape.' Barry speaks of the large black grape of Sonora, but says: It now proves to be quite identical with the Zinfindael. What that grape is, he does not inform us—does not describe it.

"What do you know of the El Dorado grape, brought here from California? Is it identical with the last named, with bunches over a foot long, and weighing several pounds to the bunch here—many of them without seeds, skin thin, grapes pronounced good by those who have tasted them?"

Prof. Mapes.—Upon the subject of subsoiling mentioned by this correspondent, his statement shows that he did not give the experiment a fair trial. There are many situations where the surface soil is light and productive of surface crops which are not benefited at first by deepening the

soil down into a stiff clay, especially if it contains iron. Some persons also think they have subsoiled their land when they have only run the subsoil plow along the bottom of a turned furrow, stirring the earth a few inches deeper. When subsoiling is properly done, the share of the subsoil plow runs 12 to 16 inches deeper than the furrow of the turning plow, making a channel through the hard earth without disturbing the surface. I have never seen any land that was not permanently benefited by such an operation, though it often fails to show any improvement in the crops the first year.

How Farmers can Dissolve Bones.

Mr. Henry Cope of Chester county, Pa., wants to know "whether the water and acid should be mixed, and then the bones added, or the bones first wet and left to soak the acid afterward. The bones are ground fine without steaming or heating."

Prof. Mapes replied that where bones have been neither boiled nor burned the acid should be diluted with twenty pounds of water to one of acid, and it matters very little whether the bones are put into the liquid or put into a tub, and the acidulated water poured upon them. Of course the bones are acted upon more readily when broken fine, and they are more completely dissolved, when the acid is sufficiently diluted than when it is too strong. If used too strong, the acid dissolves the outer coating of the bone, and also appears to form a compound with the gelatin and oil, which prevents the action of the acid upon the interior. Burnt bones may be treated with acid diluted one to ten.

Josiah Spalding, the old farmer alluded to above, gives the following as his experience in dissolving bones: "I procured 150 pounds of sulphuric acid, 500 pounds of bones, breaking them on a boulder in a box, with a stone hammer, to a size less than my finger. I put the water into a half hogshead tub, and added the acid, and then commenced putting in the bones. This was an error, as the shoveling and weighing occupied some minutes. The bones should have been in such a state of readiness that they could have been added immediately after the mixture of the liquid, that they might all have the benefit of the whole operation, because the intense heat is the main power in dissolving the bones, as a few bones added after the heat had abated were not affected. The bones dissolve rapidly; in two hours, I think there were not 25 pounds not completely dissolved, and those were mostly teeth, the enamel of which had not been broken. The heat was intense, boiling furiously, and in a few minutes the tub, which was of oak, with staves an inch thick, was so hot I could hardly hold my hand upon the outside, yet it was not injured for future use."

Prof. Mapes.—He is mistaken in supposing the heat to be the main cause of the quick dissolution of the bones. The mixture would have produced the same effect if allowed to become cool before adding the bones. When the acid is used so strong as Mr. Spalding made it, the first bones put in are affected quickly and take up the strength of the acid, as shown by the result. It is more economical to use it in a more diluted form and wait its slower action, unless time is very important.

Mr. Solon Robinson said that he thought it a better plan to put the bones

first into the tub and moisten them with water, and afterwards add the diluted acid sufficient to dissolve the mass. Instead of using acid strong enough to dissolve the bones at once, it would be better, after the mass is saturated with the acid, to put it into a pile composted with loam and fine manure, where the decomposition of the bones would be completed.

Salt and Lime Mixture.

Prof. Mapes.—As we are constantly asked how to prepare the salt and lime mixture, I will give my mode of preparing it:

PREPARATION OF THE MIXTURE.

Dissolve one bushel of salt in as little water as possible, and as cold water will dissolve more salt than hot water, it should be preferred. With this, slake three bushels of caustic shell lime hot from the kiln; all the salt water will not be taken up by the lime at the first application. The mass may be turned over the next day, however, and the remainder then added. It should be turned over frequently for a few days, so as to permit every particle to come in contact with the atmosphere. The chlorine of the salt combines with the lime, forming chloride of lime, and setting free the soda, which in turn takes carbonic acid from the atmosphere and becomes carbonate of soda. Thus commencing with lime and salt, we have as a result, chloride of lime and carbonate of soda, four bushels of which thoroughly mixed with a cord of swamp muck, woods earth, or other organic matter, will disintegrate it to a fine powder in from thirty to ninety days. This lime and salt mixture is an admirable top dressing for grass and grain crops, and if sufficiently old for all the necessary chemical changes to have occurred before use, has none of the immediate effects of salt. When placed around peach trees, it prevents the aggression of the peach worm, and from its peculiar hygrometric powers, ameliorates drought. We have known clover-sick land to be restored by its use. It renders clays less plastic; slight quantities may be used in the hog-pen with benefit, correcting that difficulty with hog-pen manure so well known to gardeners, of rendering the whole brassica tribe subject to ambury, or fingers and toes. It may also be used in small quantities for underlaying the bedding of animals in stables.

Sawdust, spent tan, and other substances difficult to be decomposed, are rapidly torn apart by the use of this mixture. Leather chips, which refuse to yield to all other means of practical decomposition, are rapidly robbed of their tannic acid and decomposed as readily as raw hide. In many districts of the country, the use of lime has been too extensive, and the lands bake, crack and puddle during rain storms, so as to become nearly useless. These may all be restored by subsoil plowing and top dressings of salt, as before recommended.

Silkworm Eggs.

Mrs. Celia Abbott, of Tedrow, Fulton county, Ohio, is anxious to begin the silk business, but, like many others of the same disposition, does not know where to get the seed, and writes with a faint hope that some member of the Club can give her the information.

The Secretary, Mr. John W. Chambers, replied that silkworm eggs have heretofore been furnished by Mr. John M. Summy, Manheim, Lancaster county, Pa., and he presumed they can still be obtained of him. It must be understood, however, that the eggs are not easily transported in warm weather. They have to be kept in an ice house or very cool room during spring, else they will hatch before the mulberry leaves are grown, and perish for want of food. When sent by mail in warm weather, they are very likely to hatch on the way.

A Carrot Weeder.

Mr. R. W. Arnold, Westport, Essex county, N. J., says: "Will you tell me whether there is any kind of tool known to you that will weed carrots or beets by horse or hand, and do it well? I wish to plant 30 inches apart, and if there is any kind of labor-saving implement that will work between the rows and close up to them, I would like to get one."

Mr. Robinson.—I wonder if this man has read the previous reports of these meetings, or has ever looked over the tools of one of our agricultural warehouses, or has ever been to a great exhibition of farming tools at any State Fair, or has ever visited any of the market garden farms near this city with a view to learn useful lessons? If he had, he must have learned that there are just such tools as he is in want of, which do the work "well."

Prof. Mapes.—The tool long known as Langdon's Cultivator has been improved upon since first brought out, till almost all the work that is necessary in weeding any crop can be done by horse power. I have a carrot weeder that cuts up and combs out the weeds, and which a boy twelve years old with a trained mule can work between rows sixteen inches apart, and do more work than a hundred men. These weeding tools are made to expand to suit any width of rows, and cut any depth from one to three inches.

White Willows.

Mr. Thomas P. Boyd writes from Greigsville, Livingston county, New York, inquiring about "white willows, and whether cuttings for propagating could be obtained for reasonable compensation, and how much?"

Mr. Solon Robinson.—As this is the common large willow of the country, the cuttings can be had for a mere nominal price. I should be willing to sell all that any one could cut from one very large tree upon my farm for one dollar a thousand.

Mr. Prince.—This is the *salix alba,* common all over this country. There are two upright-growing willows, the golden and green. The latter is the *salix alba.* It is extensively planted in Sweden and Norway along the public roads, to cut for its wood. It is sometimes called the swallow-tailed willow in Europe. It roots deep and is very hardy and will grow upon dry or wet land, and I believe where the tide sometimes overflows the land.

Mr. Bergen.—This must be a mistake, and people should be cautious not to plant where the tide overflows. The best way to propagate this or any other willow is by cuttings instead of rooted plants. You may set poles four inches in diameter two feet in the earth, and they will make trees

sooner than trees with roots. They are not as much affected by the wind when first set.

A gentleman said that all tall-growing trees upon a loose soil like that of an Illinois prairie are apt to decay at the top early. He recommended apple trees of a flat-growing habit. A tall tree sends its roots deep, and they reach the water and decay, and then the top follows suit. A flat-growing tree spreads its roots near the surface, which are consequently more healthy in a wet soil.

A New Blackberry.

Mr. H. H. Doolittle, of Oaks' Corners, N. Y., who gives name to an improved black-cap raspberry, writes that he has a new blackberry, which he obtained from the woods three years ago. The canes are nearly free of thorns, and grow reclining, four or five feet long, with long branches, which have to be supported when loaded with fruit, the berries of which are about half the size of the Lawtons, and very excellent, soft, juicy, sweet, but too tender for a market berry, if to be transported a long distance.

The Sour and Sweet Apple Question.

This question was again brought up, and pretty thoroughly ventilated.

Mr. Prince said that the theory of making apples, one side of which would be sour and one side sweet, by uniting two buds, was ridiculous; and he utterly disbelieved in the existence of such apples. He, nor his father, in his lifetime, had never been able to obtain a distinctly marked specimen of a sweet and sour apple, except so far as exposure to the sun made one side a little less acid than the other.

Prof. Nash.—I will not say that I have seen and tasted such apples, but I have been told by men of the greatest trustworthiness of an apple tree in Massachusetts, the fruit of which was not only sweet and sour most distinctly upon the two sides, but one side was red and the other a light color, and one-half outgrew the other, so that the apple had the appearance of the halves of two apples—one much larger than the other—joined and grown together. The testimony is so strong that I cannot disbelieve it.

Dr. Church, of this city, said that he had not only seen but tasted such apples, most distinctly marked upon the opposite sides sweet and sour. They were grown by Mr. Wheeler in Butler, Wayne county, N. Y.

Mr. Solon Robinson.—I have a number of letters upon this subject—not all of them affirming the sour and sweet in the same apple, but that sour and sweet apples grow promiscuously upon the same tree. I will give some of these:

Mr. Wm. R. Prince.—My father and myself never saw one; I think if they had been grown we should have seen them. If such apples are raised let us see them; we must not rely upon hearsay testimony.

Mr. Geo. Hamilton, of Penn Yan, N. Y., affirms that there is an old tree upon the farm of D. Stephenson, formerly owned by B. Smith, and two others produced by grafts from that tree, another on the farm of S. Millspaugh, and one on his (Hamilton's) farm, all of which produce apples that are sweet and sour in the same specimen. "The apples are not all of the

compound variety; some seasons they will be nearly all sour, resembling the Rhode Island Greening, and at others a yellow, sweet apple, of very fine flavor. When the perfect compound apple grows, it is something of a triangular form, the ridges being sour, and the flat sides sweet."

Mr. Geo. W. Dean of Westfield, Geauga county, Ohio, says that he has this sweet and sour apple; "that it is of no account, except as a curiosity, and has been the occasion of endless lies. Elliott says 'it is the result of diseased propagation.' I wish he had told how he knew. It is idle to believe it could have been produced by any mechanical process of budding or grafting. I know this sweet and sour apple well, and believe there is but one kind. It bears a strong resemblance to the Rhode Island Greening, both in the wood and fruit, and that is probably the parent of it. I would like to know its origin and cause. Is it possible that the pollen from a sweet apple blossom could be so mixed with the pollen of a sour apple blossom at the time of fertilization as to produce the result? The apple is not always one-half sweet and the other half sour. It is sometimes one-sided. In that case the largest part is sour, but there are generally ridges from base to crown, and invariably the ridges are acid, while the hollows are sweet. One year ours were smooth, and then there was no trace of acid about them."

Mr. Thos. P. Boyd says such apples are very common throughout the Genesee Valley.

Mr. J. L. Aldrich, of Greenville, R. I., gives the most positive testimony to prove hybridization in the blossom that I have ever seen. He says: "I have a Teft Sweeting tree in one of my orchards which has occasionally borne apples, one side of which had the smooth, light colored skin and intensely sweet flavor of the Teft Sweeting; and the other part (the sweet and sour sides being separated by a distinct ridge) the rough, dark skin of the Pearmain Russet; the rough side having also the exact taste of the Russet. Now, the imperfect ripening of one side of these apples could hardly account for their external appearance, even if it did for their flavor, for the two kinds of apples are very dissimilar in appearance as well as taste. Russet trees stand within fifty feet of the sweet apple tree. I have, in several instances, shown these mixed apples to those who were incredulous in relation to such *freaks of nature;* and, after tasting the opposite sides of the fruit, they all agreed with me in the opinion that part of the fruit was the genuine, unmixed sweet apple, and the other part as clearly sour. The line of demarcation between the sweet and acid parts has in all cases been sharply defined by a slight ridge. Several other instances of apparent hybridization of different kinds of apples have occurred in my orchards. Two trees, a Rhode Island Greening and a Roxbury Russet, stand close together, the limbs on the opposite trees touching each other. Last autumn, a bushel or more of the apples on the side of the Greening tree next to the Russet so closely resembled the latter apple in appearance and taste, that those who helped to pick the Greenings could hardly distinguish them from Russets; they were mixed in all imaginable forms, both of the different kinds being on the same limbs. I have picked the apples on this tree for the last ten or twelve years, and have never before observed such an apparent mixture of fruit on it."

Mr. Bailey, of Hawley, Orleans county, N. Y., stated to the Club that he had a tree upon his farm that produced such apples. He could not say that they were produced by joining halves of buds.

Mr. Bergen said that one man had assured him that he had grown apples, one side sweet and one side sour, by joining halves of buds and inoculating.

Mr. Solon Robinson said that he would give a dollar for an apple produced by any such hocus pocus process of budding.

Mr. D. Byron Waite, of Springwater, N. Y., sends specimens of two kinds of apples from the same tree, the green ones bearing a close resemblance to Rhode Island Greenings, in looks and taste, but not as good; and the yellow ones are like them in texture of flesh, but in taste are decidedly sweet, though far from excellent. I fully agree with Mr. Dean, in the opinion that the variety is a worthless one, and should not be propagated. I would cut down such a tree, or make a new top for it of better sorts. Such mixing as Mr. Aldrich speaks of cannot be avoided. Mr. Waite writes: "I hope you will be able to put the subject at rest as to there being such a thing in existence as an apple bearing sweet and sour."

Mr. Robinson.—I hope so too. I could give much more testimony of the same sort, but think this enough. I have now no doubt about the production of such apples. I have no doubt they are "freaks of nature," and impossible to produce by grafting. I consider the question fairly treated upon both sides. Let it rest, and let us adjourn.

Adjourned. JOHN W. CHAMBERS, *Secretary.*

April 21, 1863.

Mr. Hawxhurst, of New Jersey, in the chair.

Cultivation of Corn.

Mr. Luman Case, Bristol, Vt.—Permit me to say that we are very highly pleased with the many interesting observations emanating from the society called the American Institute Farmers' Club. But, sir, we would like the gentlemen members of the Club to be a little more definite on some of the different kinds of field crops we are in the habit of raising, such as corn, potatoes, wheat, rye, oats, etc. We are much edified by the different suggestions of the members, but before acting upon them we wish to see more uniformity in the opinions of the best farmers as to which is the best course to pursue to insure a good crop, as it might save time. I will here state the method I practice with corn, which has never failed, in a propitious season, to insure a good yield. I am now over seventy years of age, and have followed farming principally for a living. If I plant on greensward, I apply twenty-five two-horse wagon loads of bone manure to the acre, before plowing; I commence by putting my first row of manure close to the edge, east and west, taking care to have each pile of a uniform size, and the same distance apart; I put the last row the same distance from the edge that the rows are apart. I then commence to spread from the

row of heaps first put on, and spread towards the last edge. I commence plowing at the same time, and plow but about four inches deep. I then roll the furrows down well with a light sharp-tooth harrow, and harrow it lengthwise thoroughly. I then apply about ten loads of good fine manure to the acre, observing the same rule in its application as in the first instance. I again harrow it well both ways, when it is fitted for planting. I plant the seed corn direct from the cob, placing the hills at least four feet apart each way, being sure to have the rows east and west. As soon as the corn appears above the surface of the ground, I stir the soil well throughout the field with a hoe and cultivator. As soon as suitable to weed, I hoe again, letting but four spears stand in a hill. Just before silking, I hoe well again, drawing round the hill a suitable quantity of manure and loose dirt. After it has fairly silked out, I take a sharp knife and cut out all the suckers and barren stalks, and let them fall around the hills. After being well glazed, I cut it up, put five bundles in a stook, and let it stand till well cured before husking. I plant as near the 15th of May as convenient. I have the best kind of seed corn; it weighs 61½ pounds to the bushel; it is sweet and very yellow; I get from 75 to 116½ bushels to the acre. If these few observations meet with a favorable reception, as I hope they may, I will, in my next, give my views as to the best method to insure a crop of potatoes, as I think I have the best quality in America.

Seedling Potatoes.

Mr. G. M. Card, of Sylvania, Bradford county, sends me a box of two kinds of seedling potatoes produced by him, which he thinks, of course, rather better than any other potato ever grown. If he does not, he is unlike other producers of new seedlings. Will any gentleman take them off my hands and give them a trial?

Mr. John G. Bergen.—I have tried a good many new seedlings, but have to come back to old and well tried sorts. I should not be willing to pay express charges upon any seedling potatoes I have ever seen. If these are worth it, they are an exception. Of thirty varieties of potatoes that I have experimented with, I have now only two or three, and I consider the old Mercer one of the very best to rely upon. The Buckeye is a good early potato and growing in favor with farmers. The Dikeman is also a good potato for early marketing.

Dr. Trimble.—I find the Buckeye in favor in Monmouth county for two reasons. It sells well in the market, and the crop comes off in time to sow wheat upon the ground, which is well prepared by digging the crop. For quality, there is no sort superior to the old Mercer. Perhaps the best for use at this season is the old blue Pinkeye.

Mr. Bergen.—There is a kind brought here from Nova Scotia that is excellent at this season. There are several sorts called Mercers. I have grown two, quite distinct. My yield is from 80 to 200 bushels per acre. The Mercers have given some of our Long Island farmers 300 bushels per acre. The Carter is a poor yielder. The Peach-blow potato requires a longer season than the Mercer, and is not good if grown in a wet season.

Prof. Nash.—The Carter is the best potato in Massachusetts, the Mer-

cer next, and a small yielder; not as good as Peach-blows. Perhaps the Mercers grown there are not the same sort as those so highly commended here.

Mr. Bergen.—As a general rule, the kind of potatoes that grow the largest tops exhaust the soil most, without regard to quantity or quality of roots. It is so of other crops. I grow the Ox-heart cabbage for early market sales, and the large Drumhead for late. The receipts per acre are about the same, but the early is the most profitable because it exhausts the soil the least.

Curing the Potato Disease.

Mr. A. R. Lemen, of Watervliet, Berrien county, Mich., writes again, affirming his belief that he has discovered a certain, sure remedy for the potato rot, and wants the $10,000 which was offered some years ago by Massachusetts, which we said this Club was ready to guarantee. Mr. L. asks, "What evidence do you require of the fact that I can do what I say?"

Mr. Robinson.—Simply the evidence that will positively prove the thing you call a fact true.

Mr. John G. Bergen.—I believe that I can grow potatoes free of disease, if I grow them upon land so poor that it will not produce more than 20 or 40 bushels upon an acre.

Tree Cotton.

Mr. H. C. Stebbins, of Barns, Shiawassa county, Mich., wants to know if the tree cotton seed advertised is a humbug.

Mr. Robinson.—The Club has already given its opinion in full, that the tree cotton is a humbug, and we again caution people not to buy seed that is represented as producing trees that bear cotton in any Northern State.

Flax Culture.

Mr. Fayette Shepherd, of Wellington, Ohio, writes the following valuable information to those who desire to sow flax:

"In common with many others, I rejoice that flax is to be sown more extensively this spring than formerly.

"To relieve those who would sow, but have not the fine, well pulverized soil recommended by your Club, I would give my experience in flax raising. Having turned over more soil than I had seed plant, I sowed a part of it to flax; to my utter astonishment it was tall, well-coated, excellent. Having been taught to sow flax on a well pulverized soil, I mentioned the fact to my neighbor, a mile from me, whose crops surpassed all others. His reply was, '*I* always sow flax on greensward.'"

Prof. Nash.—If sod ground is used for flax it must be finely pulverized on the surface with a harrow, and the seed covered with a bush drag.

Mr. Wm. R. Prince.—It appears to me that the whole question is in a nut-shell. Pulverizing the soil is not the most essential to grow flax; the most important point is, does the soil contain the proper nutriment suitable to the flax? I should say an old grass field would be very suitable, the number of fine roots would pulverize the soil better than nearly any other crop.

Wisconsin Wild Fruit.

Mr. Wm. R. Prince.—Mr. Robinson read a letter last week from Mr. D. K. Beal, about a wild fruit that he called a cherry. In this he is mistaken; the fruit is a plum. It is the Prunus Pumila of Pursh, and Corasus Pumila of Torrey and Gray. The bush is the size of a currant bush, fruit large for a wild fruit, about the size of an Ox-heart cherry, flavor like choke-cherry, but not so astringent. It spreads by the roots, which send up shoots wherever the soil covers them. They grow in very sandy soil.

The Time to Sow Flax.

Dr. Trimble.—In old times, when Pennsylvania farmers used to grow a flax crop every year, they made a point of sowing it on Good Friday. The rotation was generally corn upon sod, then oats, then flax. They took care to make the soil very fine.

Acclimation.

Mr. Prince gave the following as his opinion upon this question: In this regard there exist very erroneous views. No plant or animal has ever been acclimated in the *existing race* by any change of location; such amelioration attaches only to their progeny. Seminal reproduction can alone effect any such change, and then only gradually through succeeding generations. This results from a great natural law, by which every animal, tree, or plant partakes in a degree of the character of the climate and soil where it is generated.

A Barren Grape Vine.

Mrs. Mott, of Potsdam, N. Y., says: "How shall I treat an old wild grape vine? It never has seen a knife; hangs full of blossoms every year, and never has any fruit. Now, how shall I treat it to make it bear?"

Mr. Robinson.—The vine is probably one of the barren sort, which flower regularly and are very odorous, but never produce fruit. There are many such wild vines.

Mr. John G. Bergen.—The best thing to do with it is to graft it with some approved variety, or dig it up and plant a young vine.

Mr. Fuller.—Cut back to the lowest healthy spurs on the vine; if cut back too much, in a single year the roots will decay.

A French Jelly.

Another lady wants further information about the method given at a former meeting of the Club: "Will you please tell us how long it must be stirred, and if any other kind but loaf sugar will answer?"

Several methods were suggested in reply to a letter presented by Mr. Robinson, asking information. The one most approved was the following: Pass the currants between rollers so as to burst each currant—then press out the juice—place the juice, in a perfectly clean copper or brass vessel, over the fire, heating slowly until it *simmers*, being careful not to permit it to boil, or the aroma of the currant will be lost—skim until scum ceases to rise, then pour the hot juice on to *loaf sugar*, broken, and held in a

wooden tub—stir until the sugar is melted by the hot juice, then pour into glasses or other vessels; when cold it will be found to have *jellied* most perfectly. When currant jelly is thus made, it is of a bright color, and not blackened and without aroma, as when the sugar and juicĕ are cooked together. It should be remembered that water boils at 212°, currant juice at about 213°, while currant juice and sugar require 240°, and at this latter temperature the more volatile portions pass up the chimney, while the mass is darkened in color and frequently so disorganized by the heat as not to form a firm jelly.

The Cathead Apple of Maine.

Mr. Edward C. Chase, of South Yarmouth, Me., commends very highly an apple grown in that section, known as the Cathead apple. "It is the best early apple in the country; is ripe by the first of September; color, red; flavor, tart; and commands a high price in market. They are but little known out of this county." Mr. C. offers to send scions, if any one wishes to propagate them.

Why Hens Eat Feathers.

A poultry raiser says the cause of hens eating feathers is a want of lime. He says: "In the discussion it was stated that the hens were well fed, and supplied with fresh meat, and confined. Now, such feeding would stimulate their laying qualities, and if in their confinement they could not find lime for the shells of their eggs, their instincts taught them to take the next best substitute, which was the feathers. Now, it should be known to all who keep poultry, and especially when in confinement, that a supply of lime, such as old plaster or pounded oyster shells, is absolutely needful for their healthy existence and reproduction; and, when it can be obtained, a portion of pounded slate, mixed with their soft food, will enrich the flavor and quality of their eggs.

Adjourned. JOHN W. CHAMBERS, *Secretary.*

April 23, 1863.

Mr. Edward Doughty, of New Jersey, in the chair.

Substitute for Coffee.

Mr. H Butts, of Cambridge, Vt., describes a substitute for coffee, grown from seeds found in a chest of tea: "The plant, while growing, looks like the old-fashioned coffee bean, but it grows much taller, and does not taste like it, and it makes a nice cup of coffee, that few can tell from Java.

"The stalks are seven feet tall, filled with seeds from within a foot of the ground to the top. It is as easily grown as corn; is planted in rows or hills, like beans, one seed in a place, about the middle of May."

Prof. Mapes thought the best substitute for coffee was okra seed.

Japan Rice.

Mr. Wm. S. Carpenter.—Here is a sample of rice from Japan, which grows like wheat upon upland, and is said to produce as well as the common lowland rice. The kernels appear to be somewhat different, though coated with the same gritty husk. I shall plant these grains, and see what they will produce.

Mr. Solon Robinson.—Upland rice is nothing new, as it has been grown to a large extent in this country, producing 50 or 60 bushels per acre, but its cultivation in South Carolina has not been as profitable as that grown upon flooded lands.

Other Things from Japan.

Mr. Carpenter.—This country is already indebted to Japan for a good many valuable things. The best melon (the white musk) that we have came from there, and we are getting new plants and seeds from that country every year.

Mr. Wm. R. Prince.—For upwards of 25 years, nearly all our gardens, both in this country and in Europe, have been decorated with plants from China and Japan—I may say fully one-half—the lilies, spireas, wigelias, &c. An impression seems to be very prevalent that the shrubs and plants from those countries are not hardy; but it should be borne in mind that a great portion of those countries is as cold as New York, and therefore nearly all their plants will grow with us.

Mr. Solon Robinson.—The best thing that we have received from Japan is tea, which is far superior to any, or at least to most of that from China. It is the very best we have in this market.

New Fiber Plant.

Mr. A. S. Hart, of Tompkins county, N. Y., sends a sample of the fiber of a plant called "Musk," or "Mountain mallows," which he thinks "would be profitable for the paper manufactory. It is easily raised; how long it will live I don't know, but it lives through the winter here and grows thrifty. My wife has it for an ornament. I read *The Tribune*, and see that considerable is said in your Club about something for making paper. If this plant is worth mentioning, show it to the Club and see if it has any value."

No one present recognized the plant by the names given, nor the fiber, though all thought it appeared likely to be valuable.

Mr. Wm. R. Prince, Flushing, L. I., would be glad to have Mr. Hart send him a specimen of the plant, or at least inclose some leaves, flowers and branches, and description, to enable him to ascertain the botanic name and character, which he would do and report.

Wild Buckwheat.

Mr. James P. Smith, of St. Peters, Minnesota, sends samples of the seeds of the wild buckwheat, and his plan of getting rid of the pest. He says:

"My plan to eradicate this pest is to plow early enough in the fall for the seed to come up, and the frost will kill the plants. If I cannot finish

the plowing early enough for the above purpose, I plant all I can in the spring, and cultivate and hoe often, for I am a Connecticut Yankee, and believe a hoe is an indispensable article, even in Minnesota. What I cannot plant I summer-fallow. If farmers of our State will pursue this course, I believe they will be pleased with the results."

He also says that "this wild buckwheat, and a medley of other foul seed that gather in the waste-boxes of wheat-cleaning machines, are often bought by our millers for the purpose of grinding into Indian flour whenever they get the contract."

Tree Cotton.

Mr. Prince called the attention of the Club to the fact that parties are advertising seed of the tree cotton, from South America, and representing that it will produce hardy trees, bearing cotton in this climate. This is simply impossible; just as impossible as it is to acclimate any other tropical plant, such as oranges, bananas or sugar cane. Men ought to use their brains, if they have any, before they invest money in such undertakings. Every dollar spent for this seed will probably equal $20 thrown away. It is a vain experiment to try to grow cotton in this latitude.

The Black-Cap Raspberry.

Mr. Prince contends that the "Improved Black-Cap raspberry," advertised by Mr. Doolittle, is nothing more than any one can get himself from the fields; that all the improvement comes from cultivation.

Mr. Carpenter says that he has faithfully tried cultivating the Black-Cap, and has failed to make it produce anything equal to the vines obtained from Mr. Doolittle. The improved raspberry is a real improvement, and grows twice as large as the wild, and more juicy and rich.

What is the Best Treatise on Fruit?

Mr. Solon Robinson—The question is asked me almost every day. Will this Club advise me how to answer? I will read one letter, as a specimen of several others I hold in my hand. A friend writes from Hartford, Conn., as follows:

"Will you please inform me what you consider the best treatise which has been published upon the general cultivation of fruits in this section of the country?

"Several years since I planted quite a number of pear and other fruit trees, with which I took considerable pains, intending to have the work done in the best manner. Although I cannot call the result a failure, I am convinced it should have been much better; and the feeling which I then had, that there was a want of some good practical treatise containing plain directions upon the subject, has been fully confirmed, both by my experience with those, and with a small vineyard since commenced. Some time ago you recommended Dr. Grant's Catalogue of Vines as containing the best published directions for the cultivation of the grape. I obtained one, and became much interested in the subject, and succeeded with a small vineyard. He is now publishing another work devoted to fruit

culture. What is your opinion or that of your Club about it? The public are interested in this question."

Dr. Trimble.—This is a very sensible letter, and pertinent inquiry, but I don't know about the Club recommending any particular work. I have heard a good deal about Dr. Grant's new paper called *Landmarks*, but have not read it enough to give an opinion, though I think it is undoubtedly the best adapted to the wants of fruit-growers of any periodical that is published.

Mr. Prince said that Dr. Grant was very capable of giving instruction about grape culture, and that his paper, called *Landmarks*, was wholly devoted to that subject, and that there was no work upon general fruit culture. He recommended Downing, and Hovey's magazine, for general cultivation, and Grant for grapes.

Mr. Solon Robinson.—The gentleman certainly has not read late numbers of *Landmarks*, where "How to plant trees" is fully discussed and illustrated by engravings. I have a letter from Charles Downing, who, incidentally speaking of Dr. Grant's new enterprise to endeavor to enlighten the public, says:

"I would add that I think the *Landmarks* a valuable publication, and when the public is educated up to its standard, it will be highly prized. It is, however, ahead of the people, and not sufficiently condensed for most readers."

Mr. Robinson recommended that a committee be appointed to consider and report these inquiries about works upon fruit culture, but the Club thought it would be a thankless, if not a hopeless undertaking; that, if Dr. Grant is publishing the best American work upon fruit culture, the people will soon find it out, and appreciate the undertaking.

Mr. Carpenter said that he approved of giving the public all the information possible, yet it was a fact that about as many succeed who never read as there are among those who have access to all the books.

Prof. Mapes.—Books are for those already "skilled in the art." To understand what is written upon fruit culture, one must already be a good culturist.

Dr. Trimble—I think reading, talking or teaching of very little importance, if ahead of the people. Here I have been for twenty years studying the habits of the curculio, until I know all about that insect, and I have been trying to teach people how to avoid its ravages, so as to grow plums, but I fear that my teaching has made but little impression.

Ald. Ely said that the Doctor was mistaken, for he had lately overheard a man in the cars telling how he read in the report of these meetings what a doctor from New Jersey said about killing curculio by spreading a sheet under the tree and jarring it, and then killing the insects on the sheet; and that he followed the advice, and got for the little trouble as fine a crop of plums as he ever saw, while his neighbors got none.

Pruning Grape Vines.

Mr. Wm. R. Prince.—I should like to make a few remarks on the subject of pruning grape vines—the method adopted by ignorant men of pruning the vines to eight feet. No American vine should be allowed a less space

than twenty feet, ten feet each side of the stem. This practice was brought to us from Europe. The experiments made in Cincinnati by Mr. Buchanan showed conclusively that this short pruning was perfect butchery, and was the reason why the fruit turned black and dropped off the vines, and by adopting the long pruning system we would be able to get good fruit.

Remedy for Cucumber Bugs.

Mr. Jabez Hawley, of Westfield, Chautauqua county, N. Y., gives the following sure remedy:

"I take young sprouts of sumac, about the size of my finger, two inches long; punch out the pith; fill one inch of the center with cotton wool; turn into each end, say a teaspoonful of spirits turpentine, and place two in each hill. The bowl of a pipe or a small phial will answer, but it will be a little better to have both ends open."

Mr. Carpenter said that boxes around the hills was the best remedy for bugs that he had ever tried. If the fence is six inches high the bugs never get over.

Ald. Ely.—A man at Norwalk, Conn., where I live, buys of the grocers all the empty cheese boxes, and takes out the heads, to use for this purpose.

Prof. Mapes.—The best way is to make the boxes of boards, cut beveling, so that the boxes would pack together, and one man can carry a large number, which is very advantageous.

About Churns and Butter Working.

Mr. L. D. Rouse and others, of Upper Lisle, Broome county, N. Y., want to know if any members of the Farmers' Club have had sufficient experience in the use of D. W. Seeley's Scientific Churn to recommend its general use. Will it make as much butter, and of as good quality, from the same milk or cream, as the common dash churn?

Mr. Robinson.—That question is easily answered by a simple "No." Nor will any other patent churn ever invented.

Prof. Mapes.—A few years since, when engaged in selling such things, I undertook to decide this question practically, and which of the patent churns was best. After trying a dozen, I found that all rapid production of butter injured the quality, and that all churns required the same amount of power to produce butter; and that if time was gained, it was at the expense of power, unless power was gained by machinery, or time gained by heat, or some other appliance, at the expense of quality. I came to the conclusion that the most economical mode was to apply power to the dasher churn, and that good butter could not be produced with less than ten minutes' churning of the cream, at the proper temperature of about sixty-five degrees.

Mr. E. Wilbur, of Albion, N. Y., gives his method of working butter by a wooden lever and block fixed to a board made convex instead of concave, as in a wooden bowl, the buttermilk running off and along a gutter through a spout into a pail. He says:

"I am not a farmer, but have been; but in the latter part of spring or fore part of summer I purchase of the farmers some 250 pounds of good

sweet grass butter—enough to last my family the year round. It is then thoroughly worked by this break; the buttermilk all worked out; a little crushed sugar (and salt if necessary) worked in; then packed tightly into clean stone crocks; a cotton cloth laid on the top; a little salt with some saltpeter sprinkled on the cloth; then about one inch of good brine poured on, and we have sweet grass butter all the year. Another item, not unimportant to many, is that in the f re part of summer butter is only worth about one-half or two-thirds as much as in winter."

Prof. Nash—I perfer October butter to that made earlier, and I prefer to pack it in large masses. A white oak barrel is better then any other vessel, but the barrel should be filled at one time. I believe the larger the mass of butter, the better it would keep.

Preservation of Timber.

Dr. Lewis Feuchtwanger.—During a recent visit to California, I examined the wharves and piers erected in San Francisco; and also in traveling through the mining districts of the State and Nevada Territory, I was principally impressed with the rapid destruction of the planks, joists and posts of the timber by the dry rot; and having conversed with many persons on the subject, learned that they sympathized with me in the ultimate disastrous condition of that disease of the timber, and from the daily reduction of the old trees for building purposes, the time may not be far distant when the present high price of timber would be doubled, and difficult to obtain at that. I was informed by a gentleman interested in the largest hydraulic gold mining company of the State, that he was obliged to replace, every two years, the props in his ditches and flumes, and is subject to very high expenses where he requires a large amount to be hauled from considerable distances. I have reflected upon the matter in my leisure moments, and concluded to make known a few remarks on the subject, which appear to me of importance.

The dry rot attacks mostly the white and sugar pine, the various species of oak, and some species of cedar; it is a fungus known in botany by the name of *merulius lachrymous*, which appears at first in delicate white filaments, spreading toward the surface and interlacing with one another, and it appears to commence on the outside by agency of atmospheric causes of change, and to gradually work inward. It no doubt affects timber in warm, close and moist situations, and appears to be nourished by the petrefactive fermentation of the juices of the plank; and Pliny, who seems to have been acquainted with this cause of the decay of timber, observes that the more odoriferous a piece of timber is, the more durable and resisting is it to decay. He also knew that the part of the timber most subject to rot was the sapwood, outside of the heart, and recommended the cutting of this away in squaring the stick. For the last century, the British and French navies have suffered much by the dry rot in their vessels of war; and instances are recorded where several ships were sunk, the timbers of which were afflicted by the dry rot; and in the mines of France, timbers used for props have been seen to crumble together within a year or a year and a half. I observed, on the Sierra Nevada, a large fresh-hewn pine tree, of four feet diameter, completely taken hold of at the inner crosscut

by the dry rot, as if worms had been gnawing at it. It is also observed that frequently the surface remains perfectly sound, while the whole central portion is rapidly decomposing. Wherever the air can circulate freely around the timber, and it is protected from moisture, or where the air is entirely excluded, as in tight structures of masonry, or beneath the surface of the water, particularly salt water, or where the wood is buried among antiseptic matters, as peat, tar, etc., all these circumstances favor the preservation. Many methods have been adopted to preserve timber from decay, and I will enumerate the principal remedies resorted to:

1. Though seasoning in dry air causes the destructive juice to be hardened, it is an imperfect mode of protection, for it may remain harmless as long as the timber remains dry, but when exposed to damp situations the moisture re-dissolves the juice, and the fungus soon makes its appearance again.

2. The seasoning in water has the advantage of removing the juice and fungus and washing it off.

3. The Earl process was introduced on the South Carolina railroad in 1836, by steeping the timber in a hot solution of copperas.

4. The Kyanising process was recommended by Sir Humphrey Davy as the best remedy, and consisted in the steeping of the timber in a concentrated solution of corrosive sublimate, or deuto chloride of mercury.

5. Sir William Burnet has introduced into the British navy the chloride of zinc as the most powerful antiseptic, and he forces this substance by hydraulic pressure in timber, from which the air is first extracted.

6. De la Boucherie, a celebrated French chemist, published, twenty years ago, a work, in which he strongly recommends the pyroligneous acid and pyrolignite of iron for the prevention of dry rot.

7. In 1832 I applied the liquid silex or soluble glass, by order of the government, to many spiles and piers at the Brooklyn navy yard, which proved highly successful. It is still my opinion that the soluble glass may be very beneficially introduced for the protection of timber, which can, at a trifling expense, be rendered fire and water proof at the same time. The posts, planks, joists, or railroad sleepers, or any other cut timber, is put in close steam-boxes, and after destroying the organic matter by boiling, the soluble glass is introduced, and the pores are filled up by the mineral substance.

Fences, wooden buildings, bridges, and wooden warehouses, may effectually be secured against fire at a trifling expense, by painting the outside with a silica paint, so that rain, snow and sun will not affect them.

Six Best Varieties of Grapes for Out-door Culture.

Mr. Prince recommended the following as the best six varieties for out-door culture in this latitude, viz.: 1st, Black Imperial; 2d, August Coral (bright red); 3d, Catawissa, large size, good flavored; 4th, Clinton (colors well); 5th, Hartford Prolific, musky if plucked before ripe, and the grapes drop on wet land; 6th, Adirondac is a good grape; when exhibited at Boston, September 24th, it was unripe, and therefore improperly condemned.

Adjourned. JOHN W. CHAMBERS, *Secretary.*

PROCEEDINGS OF THE POLYTECHNIC ASSOCIATION.

ORGANIZED UNDER THE NAME OF THE MECHANICS' CLUB, MARCH 2, 1854, WHICH NAME WAS CHANGED TO THE POLYTECHNIC ASSOCIATION, MARCH 16, 1859.

RULES ESTABLISHED FOR ITS GOVERNMENT BY THE BOARD OF SCIENCE AND ART.

First. A Club for the promotion of manufactures, arts, and for the discussion of mechanical subjects, is created under the name of the Polytechnic Association.

Second. The Polytechnic Association is an agent of the committee of arts and sciences, and is under its entire control, in the same manner as the Farmers' Club is of the committee of agriculture. The transactions of the Association are in the name of the American Institute.

Third. The committee of arts and sciences appoint, annually, the chairman and secretary of the Polytechnic Association. In the absence of the chairman and secretary, persons to supply their places will be chosen at the meetings of the Club.

Fourth. Every member of the American Institute shall become a member of the Polytechnic Association, by signifying his intention to the chairman thereof.

Fifth. The name of any person eminent in practical mechanics, engineering, mathematics, astronomy, chemistry, natural philosophy, social philosophy, geology, mineralogy, practical mining, meteorology, natural history, manufactures or the arts, may be proposed by the members of the Association (by ballot, five-sixths of those present voting affirmatively) to be an honorary member of the Polytechnic Association of the American Institute; and when so proposed, if approved by the committee of manufactures, science and arts, of the American Institute, a certificate of membership shall be issued by said committee.

Sixth. The Chairman of the Polytechnic Association is authorized to arrange sections, or standing committees, embracing all the physical and exact sciences, particularly those named in section second of these rules, and to appoint a committee for each section, who shall report the doings of the sections to the Association. Members, and honorary members, shall be entitled to seats in those sections.

Seventh. Such papers read at the Polytechnic Association as are accepted for that purpose, will be printed under the direction and at the expense of the American Institute, which also provides a place of meeting, lights and fires. No other expenses are to be incurred, except by special appropriation of the American Institute, according to the rules and by-laws; nor any liability incurred by the Institute, except on special resolution.

Eighth. The meetings of the Polytechnic Association are free of all expense to those who attend them.

Ninth. The Polytechnic Association shall select, in advance, a subject

for discussion at each of its meetings, which subject shall be announced in the call of meetings.

Tenth. Written communications to the Association are to be read by the secretary, unless objection is made; and if objected to, will be read, if it be ordered by a majority of the members present.

Eleventh. The Polytechnic Association will recommend what papers read before them, or what part of other transactions they judge worthy of publication, to the committee of arts and sciences, by which the publication may be ordered in its discretion.

Twelfth. No person attending the meetings of the Association shall speak more than once on any one subject, nor shall occupy, in such speech, more than fifteen minutes, except by permission of the Association.

Thirteenth. The chairman may invite any person to address the meeting or to participate in the deliberations, but such person, not a member, shall be announced as a visitor.

Fourteenth. Topics presented for consideration, or the announcement of a discovery or invention, improvement or novelty, or the exhibition of any machine or part thereof, or any manufacture or article, must be preceded by a statement setting forth the point, in writing, to be deliberated upon.

Fifteenth. Any person desiring to put on record any supposed or real discovery in science, manufacture or arts, may address a communication to the chairman of the Association, under seal and properly indorsed, which shall be preserved in the archives of the American Institute as evidence for the party depositing the same.

Sixteenth. In all cases not provided for by the rules, Jefferson's Manual shall be taken as a standard.

Seventeenth. The official reports of the meetings of the Association shall lie upon the desk of the recording secretary until 11 o'clock of the day following the meetings, for the inspection of members, and such corrections as are necessary before going to the public press.

Eighteenth. The minutes of the previous meeting shall be read at the opening in order for correction, unless otherwise directed by the meeting.

Nineteenth. No argument is allowed between members. Facts alone are to be stated.

Twentieth. All questions of order are decided, without appeal, by the presiding officer.

American Institute Polytechnic Association,
May 8, 1862.

The Chairman, Prof. Chas. A. Joy, presiding.

The Manufacture of Soap.

The Chairman opened the discussion with the following remarks:

It is not known when the manufacture of soap was first introduced. We find mention of it in our earliest classical writers, and in the Old Testament; in Jeremiah, ii. 22, is found the expression, "Though thou wash thee with niter and take thee much soap;" and in Malachi, iii. 2, "for he is like a refiner's fire and like fuller's soap:" but it is doubtful whether the soap here alluded to was made of the same materials as are at present employed.

The niter mentioned in Scripture was not our saltpeter, but an impure sesqui-carbonate of soda, procured from certain lakes in Egypt. Solomon was acquainted with the action of an acid upon this salt, as he says in Prov. xxv. 20: "As he that taketh away a garment in cold weather and as vinegar upon niter, so is he that singeth songs to a heavy heart." Pliny

calls it *nitrum*, and relates the circumstances attending the discovery of glass by its accidental fusion with silica, on the shore where the sailors were using it to support their kettles while cooking their dinner.

The difference between soda and potassa was not known to the ancients, and this was first recognized by Duhamel in 1735. The alchemists were of the opinion that the alkali of plants was produced by the burning, and it was not until 1764 that it was shown to be present in the living plant.

According to Pliny, the Romans learned the art of soap making from the Gauls.

Pliny says: "Soap is an invention of the Gauls, and is used for giving a reddish tint to the hair. It is prepared from tallow and ashes, the ashes of beech and elm being preferred; there are two kinds of it, the hard and the liquid, both of them much used by the people of Germany, the men in particular more than the women."

The city of Pompeii contained a complete soap-boiling establishment. It was near the sea shore, conveniently placed for the importation of the blocks of soda (niter) from Syria, and next door to the custom-house. The works were uncovered, after having been buried more than 1,700 years, and found in a tolerable state of preservation.

The first room contained lime soap. In the second were five oval vessels made of cement and coated with hard stucco, which had been used in the manufacture of soap. It is a curious fact that the pumice stones which rained down upon Pompeii and drove out the soap boiler of that day, are now ground up and used by our manufacturers in the preparation of sand soaps. Whatever may have been the origin of this manufacture, it is clear that it was carried on in a thoroughly empirical manner for many centuries. We are indebted to a man still living for our knowledge of the scientific principles which lie at the foundation of this important industry. The French chemist, Chevreul, first announced to the Academy of Sciences in Paris, in a paper dated July 5, 1813, his discovery of the compound nature of the fatty bodies. Previous to that time, fat had been regarded as an unmixed organic substance; Chevreul showed it to be composed of several salts, which he called stearine, margarine and olein. These bodies will be described by the gentleman who is to follow me.

The influence of Chevreul's discovery upon the manufacture of soap and candles was immense; and so great has the industry become that all parts of the world have been laid under contribution for the supply of the raw material. There is an oft quoted sentence in Liebig's Letters on Chemistry: "*Die Seife ist ein Massetab fuer den Wohlstand und die Cultur der Staaten.*" (Soap is a measure of the prosperity and civilization of a people.)

Liebig refers to the endless threads of manufacture which are bound up with this industry.

The extensive supply of soda ash has suggested its use in the manufacture of glass and in the preparation of soap. Sulphuric acid was necessary in its manufacture, and the supply of this acid became so great that its application increased in proportion. To make sulphuric we need nitric, and for nitric we send to explore and civilize South America, and obtain nitrate of soda, and thus diminish the demand for saltpeter and render that available for gunpowder. Hydrochloric acid is an incidental product

in the manufacture of soda ash, and this acid being remarkably cheap is extensively used in the preparation of bleaching powders, and in many manufactories; and thus one discovery ramifies in every direction and tends to the civilization of people in remote countries. In this respect, the manufacture of soap is a measure of the prosperity of a people.

I shall leave the practical operations of soap making to gentlemen who are familiar with the subject.

It is known that when a great number of bodies are buried in trenches under certain conditions, a peculiar change takes place. The olein and glycerine are often removed, and pure acids (stearic and palmitic with ammonia) remain behind. The body retains its natural shape.

During the removal of the bodies of the victims of the cholera buried in potter's field on Forty-ninth street, numerous examples of this decomposition were observed, and a body is now preserved in the museum of the College of Physcians and Surgeons on Twenty-third street. This fat is called adipocere, from *adeps*, fat, and *cera*, wax. It has been thoroughly investigated by Dr. Wetherill, of Philadelphia. The specimens on the table are from the potter's field, and the soap and candles were prepared from the adipocere in the course of some scientific experiments.

The Chairman concluded by giving a detailed account of soda ash, illustrated by diagrams and by specimens taken from each step in the process.

He then called upon a German chemist, Mr. Engelhard, of St. Xavier College, to take up another branch of the subject.

Mr. Engelhard.—Mr. President: The fats and fixed oils, used in the manufacture of soap, of different qualities and properties, are taken both from the animal and vegetable kingdoms. Chemically pure fats have neither taste, smell nor color, and leave a grease spot on paper. They are lighter than water, having generally a specific gravity of .91 to .94. All of them are soluble in ether; a few in alcohol, and none in water. Heated by themselves they will resist a temperature of 500° Fah., but above that decompose; hence their name, fixed oils, in contradistinction to volatile oils, which may be distilled without alteration.

When oils in vats are heated with the hydrated alkalies, such as lime, potash, soda, a process called saponification takes place.

To count up all the different constituents of the known fats and fixed oils would require too much time, and therefore I shall speak of those only which constitute lard, suet, palm oil and olive oil. All fats are mixtures of two, three or four closely allied substances, namely, stearine, palmatine, margarine—solid at ordinary temperatures—and one liquid, olein. The more olein a fat contains in proportion to the other constituents, the less solid is it. [The speaker then described in detail the four substances named. They are all composed of carbon, hydrogen and oxygen, in the following proportions:

Stearine................ $C_{114}\ H_{110}\ O_{12}$
Palmatine.............. $C_{102}\ H_{98}\ O_{12}$
Margarine.............. $C_{108}\ H_{104}\ O_{12}$
Olein.................. $C_{114}\ H_{104}\ O_{12}$]

If a fat or fixed oil is heated with a caustic hydrated alkali, the following decomposition takes place:

Stearine+6HO=glycerine+3 stearic acid and 3 water.

$$\begin{array}{llll} \text{Stearine } C_{114}\ H_{110}\ O_{12} & \multirow{2}{*}{=3 Stearic acid} & \left\{ \begin{array}{l} C_{36}\ H_{35}\ O_3 \\ C_{36}\ H_{35}\ O_3 \\ C_{36}\ H_{35}\ O_3 \end{array} \right. \\ \text{6 Water } \quad H_6\ \ O_6 & & \\ \hline & \text{1 Glycerine..} & C_6\ H_8\ O_6 \\ C_{114}\ H_{116}\ O_{18} & \text{3 Water.....} & \quad H_3\ O_3 \\ \hline & & C_{114}\ H_{116}\ O_{18} \end{array}$$

Stearine, palmatine, margarine and olein consist, therefore, of stearic, palmitic, margaric and oleic acids, with the base glycerine. In soap-making, the following decomposition takes place:

$$C_{114}\ H_{110}\ O_{12}+6\,(HO)+3\,(KO)=3\,(KO)+3\,(C_{36}\ H_{35}\ O_3)+C_6\ H_8\ O_6+3\,(HO)$$

The stearate of glycerine is decomposed and stearate of potash is formed. We substitute for the base, glycerine, in the original combination, a new, stronger base, potash, and form the new salt known as soap.

[The speaker next described the several acids mentioned, and pointed out the proper methods of detecting the various adulterations used in the manufacture of soap.]

The President.—There is a gentleman present who will give us some information in relation to vegetable soaps.

Mr. Austin.—In some countries the natives use the seeds of some plants as substitutes for soap, of some plants the bark is used, and of others the root. Such plants are found to abound in an acrid, narcotic principle—a vegetable alkali, called saponin; but whether their virtues as purifiers of linen depend upon chemical or mechanical action is a question I believe not yet settled. These plants are confined to a very few widely diverse natural orders of the vegetable kingdom, and frequently to a very few genera of those orders. However, it is, no doubt, contained in many plants where it is not at present suspected to exist. I will mention briefly a few of the more important plants containing saponaceous secretions. The seeds of many plants of the soap-berry family, as the horse-chestnut, contain this matter to a great extent. The fruits of these latter lather freely in water, and "a few of them will cleanse more linen than sixty times their weight of soap." Pounded and thrown into water they stupefy fish.

There are two or three genera belonging to the natural order—Rosaceæ and the tribe Guillaiæ—remarkable for their saponaceous secretions. Guillaia saponaria yields one of the barks called Guillaia, used as a substitute for soap. "Two ounces of this bark are sufficient to wash a dress," and it is said to give a remarkable luster to wool. It contains a substance which occasions voilent sneezing, and which is allied to saponin.

The California soap plant belongs to the natural order—Lilliaceæ, and to the Scillæ or onion tribe. It is used by the natives as a substitute for soap. This plant produces a thick bulb, which is inclosed in a remarkably large and thick bundle of black, coarse fibers—the remains of the nerves of former leaves.

All plants secreting saponaceous matter (and I have mentioned only some of the more important ones) contain also an acrid, narcotic, and often highly poisonous principle, and, no doubt, the two principles are identical

—saponin or an allied vegetable alkali. These plants also furnish many useful medicines, and not unfrequently highly nutritious food. The poisonous principle is readily expelled by heat, as in the manihot or jatropha, whence the cassova and tapioca are derived.

Dr. Stevens.—This is the bread fruit of Brazil, and I have seen the natives preparing it for use. The plant resembles very closely our sassafras; it has the same rough bark and the same palmate leaf. The food is derived from the root, and it probably produces a larger amount of food from a given area of ground than any other plant. A yield of 3,000, 4,000, and 5,000 bushels to the acre is not uncommon, and the cultivation is of the roughest kind. In fact, it has no cultivation except planting. The universal South American knife, the machete, is used to cut a hole in the sod, the plant is inserted, and left to take its chance. It is sure to take its chance, however. It will root out all other plants, and it cannot itself be destroyed. The root is grated in mills, the milk flows away, and the pulp is dried for food. The milk is wasted by the hogshead; I have seen a river white with it for a long distance below the grating mill. This milk is poisonous, and it contains the saponaceous principle. The women use it freely for washing their persons, and I am bound to say, that during the bread fruit harvest is the only time of year that they are clean.

Prof. Seely.—I will say a word in regard to soft soap. Genuine soft soap, such as I knew in my boyhood, is not now to be found. This was made by the farmers from the ashes of their wood fires. The ashes were placed in a barrel, and leached by pouring water upon them from time to time, and then the lye was boiled with grease to make soft soap. Now farmers come into the city and buy something under the name of soft soap; but it is nothing but a little hard soap with a great deal of water and a little sal-soda. It would be much more economical to buy the hard soap without the water.

On motion of Mr. Fisher, the subject of "Printing in Colors" was adopted for the meeting two weeks hence.

Adjourned. THOMAS D. STETSON, *Secretary.*

AMERICAN INSTITUTE POLYTECHNIC ASSOCIATION,
May 22, 1862.

The Chairman, Prof. CHAS. A. JOY, presiding.

The only miscellaneous business introduced was the presentation to the society of J. W. Nystrom's book containing an exposition of his

NEW SYSTEM OF ARITHMETIC,

with sixteen for the base in place of ten in the present decimal system. The work was referred to a committee, consisting of Mr. Stetson, Prof. Seely and Mr. Dibben, and the society proceeded to the discussion of the regular subject of the evening:

Printing in Colors.

Mr. Fisher.—It is well known that the success in printing in colors has been very imperfect, and I suppose that this is owing to the want of artistic knowledge and taste on the part of the operators. Brewster ascertained that all colors are formed by the combination of three: red, yellow and blue, which he called the primary colors. Now, I suppose that if these three were properly blended, all colors and all shades of color might be produced. Perhaps black might also be employed with advantage. I suppose that nine-tenths of the colors and shades employed in portrait painting might be produced from red, blue and black.

Dr. Stevens.—Probably the man who first printed in colors was Faust. Before the art of printing with movable types was invented it was customary to ornament the manuscript books with illuminated letters of various colors, and in order to make the printed books as nearly like those in use as possible, the printers undertook to print their initial letters in colors, and they produced some very fine results. But the practice after a while fell into disuse. At the present time, printing in colors is carried on in this country with very satisfactory results, though not so well as in England and Germany. Maps especially are printed in this way, so as to rival those colored by hand. Prof. Rogers, formerly of this country, but at present of Edinburgh, had a geological map printed in this way, which is nearly, if not quite, equal to any colored by hand. Each color is put on by a separate stone; though after all of the sheets are printed in one color from a stone, the color may be wiped off, and the same stone may then be prepared for another color, with which all of the sheets may be printed.

Mr. Gavitt.—Mr. President: I received your invitation so short a time before the meeting that I have made no preparation, and my remarks must be very desultory. The American Bank Note company print their bills in colors as a guard against counterfeiting by the photographic process. If a bill is printed partly in red, the counterfeiting photographer must remove the red before he photographs the rest of the bill, and the red must then be printed in. The colors formerly used could all be readily removed, but it was suggested by one of the most eminent chemists in the world, Mr. Sterry Hunt, that the sesquioxyd of chromium would be found as permanent as the black carbon ink. We have accordingly adopted this pigment, and hence the great quantity of green you see in modern bank notes, especially in the United States treasury notes. The sesquioxyd of chromium resists the action of all acids except boiling nitric acid, and that destroys the texture of the bill. The only way in which it can be removed is by saponifying the oil which is employed as a medium to attach it to the paper, and as the same medium is used for the carbon ink, if one is removed they both go together. We print the green over the black, and this we consider a perfect safeguard against counterfeiting by photography.

Prof. Seely.—I think, Mr. Chairman, that this apprehension of counterfeiting by photography is a bugbear. I have frequently heard of bank notes that were counterfeited by photography, and I have been told that if I would go to this place or that place, I should see one so perfect that it could not be distinguished from the genuine note. The narrators seem not

to have considered that this fact would destroy the evidence of its being a counterfeit. If it could not be distinguished from the genuine bill, how can it be known that it is not genuine? And I presume that in most of the cases in which it was supposed that bills had been counterfeited by photography, genuine bills were mistaken for counterfeits. I have seen photographs of bank notes; I have made some myself, but I never saw one that could not be readily detected, or that had been in circulation. Here is a bill printed wholly in black, and there are a great many such in circulation. If it is so easy to photograph black notes, why are not these counterfeited? It must be either because photographers are not able to do it, or because they are all too honest.

Mr. Gavitt.—Mr. Chairman, I will ask Prof. Seely one question. Here is a bank note with the letters, ONE, in red; now, is it more difficult to photograph that note than it would be if those letters were printed in black?

Prof. Seely.—It is more difficult, certainly.

Mr. Gavitt.—Very well, Mr. Chairman, that is sufficient. I hold that it is the duty of bank officers to furnish the community with every possible safeguard against the danger of being swindled by false notes, and if it is in any degree more difficult to counterfeit a note printed in colors, then all notes should be printed in colors, without any regard to the expense. I agree with Prof. Seely that the danger of circulating photographs of bank notes is a bugbear, but photography may be employed to produce lithographs of bank notes, which are the most dangerous counterfeits. There was a publication of a bank note detector started a few years ago on a new plan. It was to have fac-similes on a small scale of all the genuine bank notes in the country. You probably remember the work. Photographs were taken of just one-sixth the size of the bills, and then these were transferred to stone by the photo-lithographic process, and the bills were then printed from the stone. The photographs were made by Mr. Rehn, one of the most skillful photographers in the world, and the prints were perfect copies of the bills. It was only necessary to take a glass that would magnify just six times, and you had the exact thing. The most delicate lines were all reproduced with wonderful accuracy. Some of these lines, being so much reduced in size, were absolutely finer than the fiber of the paper, and we were obliged to have a cardboard surface in order to print them. But, of course, if not reduced, they might be printed on bank note paper. Counterfeiting by photography is a bugbear, but not by photo-lithography.

Mr. Rowell.—Have any of the United States treasury notes been counterfeited?

Mr. Gavitt.—They have not.

The Chairman.—How much of the sesquioxyd of chromium is used for bank note printing?

Mr. Gavitt.—Nearly all that is used is used by the American Bank Note company. We have consumed about 10,000 pounds within the last three years. It costs about a dollar a pound in large quantities.

The Chairman.—There is a process of printing in colors practiced in Germany, called nature printing. A natural object—a leaf, for instance—is placed under a thin sheet of pure lead, and passed between rollers. The

leaf is pressed into the lead, forming a mold for an electrotype plate, which is employed for printing. Inks of the proper color are used in the printing, and where several colors are required they are worked on the same plate, so as to print the whole at one impression. The Consul-General of Austria, Charles F. Loosey, presented several magnificent volumes of these prints to the American Institute a few years ago. It was a most valuable and acceptable donation, and I trust was properly recognized and appreciated.

A volume of the prints was brought from the library, and greatly admired by those present.

The subject of "Illuminating Materials" was selected for the next meeting, and the society adjourned.

THOMAS D. STETSON, *Secretary.*

AMERICAN INSTITUTE POLYTECHNIC ASSOCIATION, *May* 29, 1862.

The Chairman, Prof. CHAS. A. JOY, presiding.

The Chairman announced the regular subject of the evening to be

ILLUMINATING MATERIALS,

and, as he proposed the subject, he proceeded to open the discussion.

Illuminating materials are found in all three forms of matter; solid, liquid and gaseous. They generally contain hydrogen and carbon, and the light is emitted by the carbon while it is in an incandescent state, after it is heated by the burning of the hydrogen, and before it is itself consumed. I have in my hand a list of some 16 or 18 materials which have been used for producing light.

One of these is tallow. This has been used from time immemorial. Some of the vegetable oils have also been used from the most ancient times of which we have any knowledge; among these are palm oil and olive oil.

In Greece, 2,000 years ago, they used lamps essentially the same as those which are used in some countries at the present day. I hold in my hand an earthen lamp that was dug from the ruins of Athens. It has a handle upon this side and this is the place for the wick. The material burned in it was probably olive oil. It differs, you see, but very little from the lamps which we use, and all over Germany the workmen use lamps precisely like this, only their lamps are made of tin.

Dr. Stevens.—Earthen lamps are used extensively in the western part of this country.

The Chairman.—The kind of fat, either animal or vegetable, used for illuminating in any country, is determined by the supply; it is a mere question of economy.

Besides the hydrocarbon compounds, there is a class of substances of a different character employed for the production of light. Among these are lime in oxyhydrogen light; the carbon points for the electric light; magnesium and quicksilver.

Magnesium produces one of the most intense lights that we have. It is only necessary to light the end of a very small wire of pure metallic magnesium in an alcohol flame, when the wire is consumed, giving out a very brilliant light. I have tried the experiment, but it is a disagreeable one to perform, on account of the effect of the light upon the eyes. It is some time after looking at the magnesium flame before the eye is able to see ordinary objects in a room. The experiment should not be tried without providing protection for the eyes. The light in this case comes from the oxyd of magnesium. The metal combines rapidly with oxygen, generating a heat which makes the oxyd formed, the magnesia, incandescent, and it is this white hot magnesia that emits the light. The magnesium light might be utilized by winding a long wire of the metal upon a reel or bobbin, and unrolling the bobbin to feed forward the wire as it is consumed, were it not for the high cost of the metal. It exists in large quantities, especially in this country. At Hoboken there are deposits of porphyry which contain magnesia, and in Westchester county are beds of dolamite, composed to a large extent of magnesia. Magnesium is abundant; the difficulty is to separate it from the oxygen and other substances with which it is combined.

Quicksilver is used to conduct a stream of electricity.

Mr. Babcock.—I should like to hear the chairman's account of the Drummond light.

The Chairman.—I spoke of that in passing. It is very improperly called the calcium light—there is no calcium in it except as lime, the oxyd of calcium. The oxyhydrogen light is formed, as you are probably all aware, by heating a bit of lime in the flame of the oxyhydrogen jet. The lime must be chemically pure, and it is consequently necessary to prepare it for the purpose. It is precipitated from a solution, and thus obtained free from silica or any other substance. It is then pressed in a powerful hydraulic press, in order to make it hard enough to be sawed into pieces of suitable size. Lime is used because it cannot be fused, and under the intense heat of the oxyhydrogen jet, it gives out the brilliant light with which you are familiar.

The oxyhydrogen flame is formed by burning pure hydrogen gas in pure oxygen. The gases are retained in separate vessels, and are mixed just as they issue from the pipes. The hydrogen pipe surrounds that which conducts the oxygen, and the oxygen pipe is now made to protrude a very little beyond the end of the hydrogen pipe. This is the latest improvement in the oxyhydrogen light.

Dr. Stevens.—The chairman forgot to mention one substance in his list of illuminating materials—bayberry tallow This is used to a considerable extent It is a vegetable tallow, produced by the bayberry bush.

Mr. Stevens.—The Balm of Gilead tree produces a tallow which has been collected and made into candles. Each bud has a small quantity of tallow, and if the buds are placed in hot water, the tallow is melted, and may be skimmed from the surface. I have collected a very little of this myself, and I have heard my mother say that she and her mother collected one year enough to serve for light for several months.

The Chairman.—Will Prof. Seely give us the chemistry of illuminating materials ?

Prof. Seely.—The more I think of the matter, the more am I amazed at what chemistry enables us to do. If you bring us a candle we do not need to light it in order to tell you what it is worth. A hydrocarbon, to give the most light, should have the hydrogen slightly in excess. If the carbon is in excess there will be smoke. It has been frequently talked over here and is now generally understood, that the light comes from the carbon, heated to a white heat. It may, perhaps, be more easily comprehended if it is presented thus: Suppose we had a quantity of carbon, in the form of coal for instance, which we wished to burn in the way to get the most light from it possible, how should we wish to arrange it? We should want it in a thin stratum so as to expose a large surface, and we should wish to keep it hot as long as possible before it was burned, for as soon as combustion took place it would be converted into invisible gas, and would cease to give out light. Finally, we should want it in small pieces, so that the light might be soft to the eye. We have no means of arranging carbon in this way. But nature makes the arrangement beautifully. By combining atoms of carbon with atoms of hydrogen, which separate at a lower temperature than carbon will burn at, the carbon is heated before it is burned; and as the hydrogen occupies much more space than the carbon, the carbon atoms are enveloped by the hydrogen, and thus kept from burning until the hydrogen is consumed. The burning, too, is confined to an excedingly thin film on the outside of the blaze, and thus the illuminating power of the carbon is fully utilized.

Mr. Chairman, we have had a very grand exhibition this afternoon of combustion of illuminating materials. Some 18,000 barrels of petroleum oil have been burning in Williamsburgh, and if it had occurred in the night, I have no doubt that we should have had the finest illumination that has ever taken place. As it was, the smoke, as seen from the lower part of the city, made the most magnificent spectacle that I have ever seen. The *Express* says that the fire originated from an explosion which occurred in one of the vessels which were lying at the wharf discharging petroleum. The account says that after the explosion in the vessel, a barrel on the wharf exploded, and the word explosion occurs half a dozen times in the account. I have no doubt that we shall have a discussion in the papers whether petrolium will explode. Some people seem to think that if you touch a match to a cask of petroleum it will go off like gunpowder, and there is quite a common notion that rock oil will explode. It will not do it. The explosion occurs in this wise: Petroleum has the property above all liquids of passing through capillary tubes. If you put it into a wooden barrel it will go right through the staves, and the barrel will be greasy directly on the outside. The most volatile portion passes through the most readily, and when this, in the form of vapor, is mingled with the atmosphere in a confined place, as the hold of a vessel, an explosive mixture is formed. Petroleum is not explosive; but a mixture of the vapor of petroleum with atmospheric air is explosive; and this mixture can be formed only in a close chamber. The question is similar to the famous one, "Will saltpeter explode?" and the answer is analogous. Saltpeter alone will not explode, any more than a stick of wood or a brick; but when saltpeter is mixed with any combustible, the mixture is explosive.

Mr. Churchill.—I understood Prof. Seely to say that many of the hydrocarbons in burning would necessarily smoke. I made a great many experiments with lamps while on the committee last winter, and I have continued them since, and I think there is no fat that cannot be burned without smoke in a still atmosphere, if the lamp is not moved about.

Prof. Seely.—You must have misunderstood me; I agree with you entirely.

The Chairman.—There are a few minutes left; will any one make any remarks or ask any questions?

I will inform the society that I shall leave the country in a few days for Europe, and I shall regard myself as a sort of traveling agent of the society at my own expense. I shall try to learn everything of interest to this Association, especially the working of similar societies, which I shall communicate to you on my return, as occasion may offer. Since I have had the honor to preside over your meetings, I have become exceedingly attached to the work. I shall be absent five months, and perhaps you ought to take some steps to provide a presiding officer during my absence.

Mr. Dibben.—Mr. Chairman, during the summer months it has been our practice to discontinue our meetings, and in the few meetings that we shall hold during your absence, we can choose a chairman *pro tem.*

On motion of Mr. Fisher, the thanks of the society were voted to the Chairman for the firm and satisfactory manner in which he had presided over the meetings.

The subject of "Superheated Steam" was chosen for the next meeting, and the society adjourned for two weeks.

John K. Fisher, *Secretary pro tem.*

American Institute Polytechnic Association, *June* 19, 1862.

Dr. R. P. Stevens in the chair.

Premiums of the American Institute for 1862.

Mr. Fisher, Secretary *pro tem.*, read a communication from the board of managers of the American Institute, stating that they had delegated the award of premiums to be given by the Institute this year to the Polytechnic Association and the Farmers' Club. A list of the premiums, and the subjects for which they were offered, are as follows:

For the best machinery for spinning and weaving flax.......Gold Medal.
For the best lifting and force pump—by hand power........Silver Medal.
For the best novelty in building materials, and machinery for preparing the same..................................Silver Medal.
For the best novelty of practical value extracted or manufactured from coal oil, coal tar, or petroleum.............Silver Medal.
For the best samples of steel or semi-steel made direct from cast iron, with the process of manufacture, and the cost of producing the same...............................Gold Medal.

For the best novelty in the construction of railroads........Silver Medal.
For the best novelty in warming and ventilating buildings, having especial regard to health, safety and economy.....Silver Medal.
For the best essay on the measure of power.... ....Silver Medal.
For the best original researches or monographs on any subject pertaining to the science of chemistry, or mechanics, or their practical applications...........................Gold Medal.
For the best samples of American manufactured flax fabrics, with the cost of manufacture..........................Silver Medal.
For a cheap and easy test of the true value of lubricating oils, Silver Medal.
For an easy and economical method of procuring the pure fatty acids from crude materials............................Silver Medal.
For an important discovery or invention in photography.....Silver Medal.
For the best original research upon the artificial formation of saltpeter..Silver Medal.
For an easy test of the detergent strength of soaps.........Silver Medal.
For the best specimens of silver or gold plating on glass....Silver Medal.
For a cheap preparation of aniline colors..................Silver Medal.
For a cheap preparation of metallic calcium...............Silver Medal.
For a cheap preparation of silicium........................Silver Medal.
For a cheap preparation of magnesium ....Silver Medal.
For the best mode of constructing fire proof buildings.......Silver Medal.
For a simple method of crystallizing sugar from sorghum...Silver Medal.
For the best water meter...................................Silver Medal.
For the best lamp to burn kerosene oil, producing perfect combustion ....Silver Medal.
For the best plan for burning kerosene oil for heating purposes ....Silver Medal.
Three discretionary premiums (gold or silver medals)—to be determined by the board of managers.

Mr. Dibben.—I see Mr. Johnson here, who is a member of the board of managers, and I would like to ask what steps are to be taken to inform those who would be likely to compete for them, in regard to the subjects for which premiums are offered by the Institute?

Mr. Johnson.—The managers will furnish the Association with circulars for distribution.

Mr. Rowell exhibited an instrument for showing the temperature at which coal oil ignites. Mr. G. Tagliabue is the inventor and maker. In Europe no oil is allowed to be sold, for illuminating purposes, which ignites at less than 115°.

Prof. Seely.—I think the instrument good, but not all that is needed. If oil is shaken, even at 90°, we may have an explosive mixture. This is the best instrument I have seen.

Mr. Johnson said he had found no difficulty in setting fire to all the oils he had tried.

Mr. Rowell.—I have tried many times and found that the vapor of oil would not ignite below 110° in this instrument. It is to test the comparative explosibility of oils, to show which are comparatively safe.

Mr. Seely.—Where oil is homogeneous the hydrometer is a good test, but, since the manufacturers have mixed oils, it is not reliable.

Dr. Stevens.—I think it important to have an instrument to test all oils offered in market, whether on store or for sale. Lives should not be jeopardized from mere ignorance, carelessness, or sheer cupidity. I have known a valuable life lost, the head of a family, dependent upon him for support, by drawing from a barrel of explosive compound sold from this city. When lives are lost from *new* causes, there is always a season of great excitement; there has recently been an increase of this from a few cases of death from explosive vapor arising from petroleum oils, while the far greater number of deaths arising from the use of burning fluid was forgotten. As to the temperature at which an explosive mixture will take place, the compound of air and vapor will take place at low temperatures, when the vapor is derived fresh from the bowels of the earth. At the burning springs of New York and Ohio, this mixture takes place at the common temperature of the air; at all seasons when the springs flow, spring, autumn, or summer, beautiful pyrotechnic exhibitions are then gotten up extemporaneously.

The subject of the evening, "Superheated Steam," being called up, Mr. Babcock said: I know an instance in which superheated steam had been in use six years, and saved 25 per cent., and the apparatus cost nothing for repairs. It is automatic. The invention is by Wilcox Stillman. The steam passes through a set of tubes; the smoke and heat cross these tubes several times; between the fire box and chimney is a damper to regulate the quantity of smoke and heat which pass over the tubes; the pressure is 50 lbs., condensing 100°; temperature of steam 450°.

Prof. Seely.—The heat used in superheating is commonly waste heat, or the heat going up the flues, in the products of combustion. Such heat makes no extra cost, and all that gets into the steam shows itself in mechanical force. The heat, however, which gets into the water in the boiler is not all available in work; until the water reaches the boiling point, the expansion, although of great force, is of such narrow limits that we do not use it. To raise water from 0° to 212°, 20 per cent. as much heat is required as to raise it then into steam; and this 20 per cent. gives no motion to the engine.

But the value of superheating is more plainly shown in another direction, and by using figures. In order to be easily understood, I use only round numbers, but numbers which are very near the exact truth: 1 lb. of water at 212° is converted into 1,700 volumes of steam, by 1,000 units of heat. The 1,700 volumes may be taken as the measure of the available mechanical force; the 1,000 units of heat are worth 1,700. Now, if these 1,700 volumes of steam at 212° be raised 500° higher, or to 712°, the bulk will be doubled; for the heat put into the steam we have another 1,700 volumes; or, in other words, the heat used upon the steam has given us the same value as the heat used upon the water. How much heat is there required to raise 1 lb. of steam 500°? The specific heat of water is 1, and the specific heat of steam .5, or a unit of heat will raise 1 lb. of water 1°, and 1 lb. of steam 2°. But in our case, suppose the steam was raised 500°, and now it is evident at a cost of 250 units of heat. The 250 units of

heat used in superheating steam have done the work of 1,000 units used upon water; heat goes four times farther on steam than on water.

If waste heat is used for superheating the steam to 712°, we double our power without increased cost for fuel; or, if the heat costs at the same rate as when used in water, we double power at an additional outlay of 25 per cent. In the first case, we realize a total gain of 50 per cent., and in the second, of $37\frac{1}{2}$ per cent. But, unfortunately, it is not yet practicable to use steam at a temperature so high as 712°; the materials we use about our engines will not endure it; we can, however, practically use steam at about 400°, and thus realize an economy as high as 25 per cent.

Superheated steam is now much used in chemical operations, as a convenient means of heating, and to effect certain decompositions. Superheated steam upon iron, at a red heat, gives its oxygen to the iron and its hydrogen escapes; upon carbon, at a white heat, its oxygen unites with the carbon to form carbonic oxyd and carbonic acid, and the hydrogen is set free; upon metallic sulphides, the hydrogen unites with the sulphur to form sulphide of hydrogen, and the oxygen with the metal; upon oils, when the fat acid is separated from the glycerine, &c., &c.

Mr. Rowell.—I hold in my hand a table of the observations made at one of the series of experiments which were tried at the Metropolitan mills in this city, in 1860, to test the value of superheating steam and of working steam expansively. These experiments were made under the direction of B. F. Isherwood, now engineer-in-chief of the United States Navy, at a cost of about $5,000, which was paid by Mr. George Hecker. They were commenced on the 1st of February, and finished on the 1st of November. An engine was constructed expressly for the purpose, and it was the first time in the history of the steam engine, in which an engine was made for the single purpose of testing questions in regard to its operation. The fuel and water of condensation were carefully weighed, and the temperature and pressure of the steam in all parts of the apparatus, as well as the temperature of the room, the barometric pressure, the temperature of the feed water, and, in short, all circumstances that could affect the result, were carefully observed and recorded every hour. It was the most valuable, as well as the most costly, series of experiments that have ever been made in regard to the practical working of steam.

The plan of superheating was to surround the cylinder with a steam jacket, and then throttle the steam in the cylinder, so as to reduce its pressure without diminishing its temperature. It was found that there was no marked economy in superheating more than 5°. At this extent of superheating, the economy was 54 per cent.; that is to say, 46 pounds of coal, with this method of superheating, did as much work as 100 pounds of coal, with steam used in the ordinary way.

Mr. Dibben.—I introduced this question with an idea that the facts brought out would show that the prejudice against superheated steam is not well founded, and the discussion has fully sustained my opinion. The statement of Mr. Babcock shows that if a superheater is properly constructed, there is no burning out of the tubes, about which we have heard so much, and the working of Ericsson's air engines proves conclusively that lubricating materials will bear a temperature of 450° without being decomposed.

Mr. Churchill made some remarks upon the use of steam in desulphurizing ores.

On motion of Mr. Dibben it was voted that the meetings of the society, during the summer, should be held monthly, on the second Thursday of each month, and the society adjourned to the second Thursday in July.

John K. Fisher, *Secretary pro tem.*

American Institute Polytechnic Association,
July 10, 1862.

Prof. Charles A. Seely in the chair.

Thompson's Automatic Gas Regulator.

Mr. Churchill, from the committee appointed to examine this invention, made the following report:

To the Polytechnic Association of the American Institute:

Your committee, appointed to examine Thompson's automatic gas regulator, submit the following report:

Table I, hereto appended, presents the mean of several readings on the meter at the pressures under which observation were taken.

The double lines, intersected between the base line and the line of each burner, being proportionable to the consumption.

Table I, column 1st, shows the pressures. Column 2d shows the ratio of consumption (100=6 cubic feet per burner). Column 3d shows the ratio of light by the photometer. Column 4th shows the ratio of light if the gas had been burnt at all of these pressures with the maximum of economy obtained at 1.5 inch pressure. Column 5th shows the ratio of the difference between columns three and four, supposing the unit of light equal to sixteen candles.

Some delay was occasioned in preparing the trials, in order that compliance might be obtained with the point insisted on by your committee, viz: that the articles sent to be tested should be such as were furnished for sale.

These experiments show that the improved burner No. 1 was adapted to burn with a maximum variation of $\frac{6}{1000}$ of 1 cubic foot per minute, with pressure varying form 1.5 inch to 3 inches, and the burner No. 2 was able to produce the same effect with the wider range of 1 to 3 inches.

These results are greatly in advance of the best hitherto presented to the Institute.

The fishtail burner, used in the experiments on the regulator No. 2, was detached, and with a variation of pressure from .7 to 1.1 inch, the consumption increased fully 30 per cent. with a further increase of pressure it commenced "blowing," burning with bursts of flame. The photometrical trials showed that this increase of consumption was waste, and this is at least fivefold of that shown in table I. Your committee lay stress upon the point, that this loss is one that cannot be charged to the carelessness

of employés, but that it eludes the eye and can only be completely met by automatic apparatus.

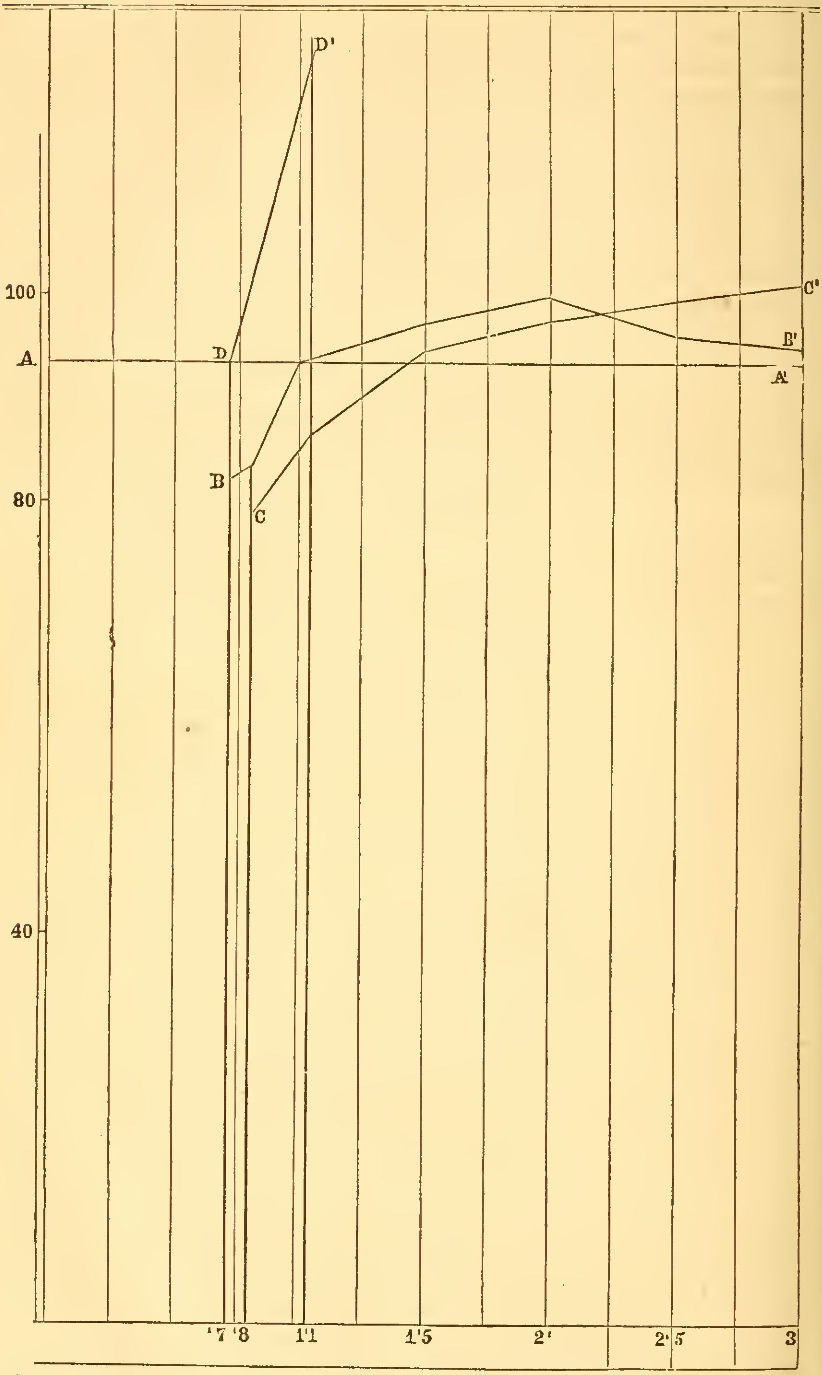
The arrangement of the parts of this regulator is calculated to convey as little heat as possible to the leather diaphragm; and results presented to your committee of leather, said to have been somewhat similarly exposed in twelve months' use, give promise of durability. They have no further guide on this point, or on the possibility of exactly uniform production; but they suggest that, by careful mechanical construction, the principle of these regulators may be rendered effective at lower pressure.

The objects to be tested were arranged in committee, viz: the range of regulation, the advantage of quasi-packing at different pressures, and the ordinary waste with unperceived "blowing." The experiments themselves were made by one of your committee only; they are, therefore, presented only on the authority of its chairman, but your committee unanimously concur in the opinions deduced from them.

Your committee are much indebted to the courtesy and liberality with which the Manhattan Gas company placed their valuable apparatus at its disposal during several hours.

(Signed) JOHN HARTLEY CHURCHILL,
CHARLES A. SEELY,
July 10, 1862. JOHN JOHNSON.

TABLE I.



PRESSURES IN INCHES.—A A′, a uniform consumption; B B′, consumption of Burner No. 1; C C′, consumption of No. 2 Burner: D D′, consumption of common burner.

TABLE II.

OF EXPERIMENTS WITH BURNER NO. 2.

Pressures in tenths of one inch of water.	Readings of meter.	Ratio of light by the photometer.	Ratio of light. (See report.)	Differences=loss to 1=16 candles. (See report.)
.8	80 80 78	91 nearly.	97	.06
1.1	87	105	106	.01
1.5	94 95	115	115	
2 0	98 97 98	117	119	.02
3 0	101 101	119	123	.04

The temperature at the time was 82° Fahrenheit.

Self-regulating Windmill.

Mr. Enos Stevens presented a plan of a windmill, in which the power is to be regulated by weight; but the plan could be understood only by means of engravings.

Measuring the Force of Gunpowder.

The Chairman.—A gentlemen called on me yesterday with a newly invented gunpowder, and in the course of conversation we had a discussion in regard to the mode of measuring the power of powder. I will suggest to the Association this plan: introduce a pipe through the wall of a strong cylinder near its lower end, and, bending the pipe at an elbow, let it rise by the side of the cylinder. Pour some water into the cylinder—more than enough to cover the end of the pipe. Then close the cylinder perfectly tight, with the exception of a hole through the cover, through which a pistol may be discharged into the interior. Will not the force of the powder be measured by the rise of the water in the pipe, the expansion of the gases by the height to which the water rises, and the rapidity of the expansion by the time in which it rises?

Mr. Dibben.—I should doubt the accuracy of this mode. The inertia of the water would cause some time to be consumed in moving it, and during this time the walls of the cylinder would be conducting heat away by convection, diminishing the amount of expansion. I have had a good deal of experience in testing powder with the ordinary *eprouvette*, and I have found the results with the same samples of powder very variable, and the effect of small charges a very uncertain indication of the effect of large charges. The *eprouvette* is a small cannon with the bore very accurately turned, and a chamber in the breech to hold a given quantity of powder, generally an ounce. The ball is turned to fit the bore nicely, the charge is weighed and poured into a chamber through a tube, so that it may all go into the chamber, and the breech is made concave to fit the ball, affording no space between the powder and the ball. The cannon is set at an angle of 45°, and the distance to which the ball is thrown is taken as a measure of the force of the powder used. But I have found that two samples of powder taken from the same barrel, and from the same half pound in the barrel, would throw the ball to quite different distances, varying sometimes 20 per

cent. It is found that with the full service charge in large cannon, the range with the same samples of powder is much more nearly uniform.

The Chairman.—The products of the combustion of gunpowder burned under different temperatures are entirely different, and as the temperature varies with the pressure, the force exerted would be affected by the ease with which the shot was moved. This fact suggests the great number of elements which come into an experiment to determine the force of any particular sample of powder, and, consequently, the difficulty of making the investigation.

Modes of Raising Water.

The regular subject of the evening, "Modes of Raising Water," was then taken up.

The Chairman.—I proposed this subject from a selfish motive—the hope of getting some information in relation to it. I shall open it with a few very elementary remarks. Raising water is the same as raising any other substance; the power required is in direct proportion to the weight raised, and the height to which it is raised. The object of most of our devices is to avoid expending power in the production of incidental effects, as the overcoming of friction, etc. The first plan adopted was doubtless that of dipping up the water in a bucket or other vessel, and perhaps this is more economical of power than any other plan that has ever been devised. The amount of friction is inappreciable. When wells were too deep to be reached by the arm, it was necessary to let down the bucket with a rope, and if a large bucket was used, it was found convenient to attach it to a lever with a partially counterbalancing weight at the opposite end of the lever, and thus the sweep came into use. Or the rope was passed over a drum, with a smaller drum on the same shaft for the counterbalancing weight. But when wells were dug in dusty cities, it was necessary to cover them over, and pumps had to be used. These are simply plans for lifting the water, the bucket being made small, and attached to a rod instead of a rope. In this case there is a great increase of friction, requiring a larger expenditure of power. I should like to hear from gentlemen present an account of the more complicated plans that are now employed.

Mr. Fisher.—I have a plan for taking water from a ship, which has not been suggested by any one else that I am aware of. It is to run a pipe from the hold of the vessel out of the stern, when the forward motion of the vessel would cause the water to flow out through the pipe. I have made some calculations, which show that a speed of twenty miles an hour would discharge the water under at least four feet head, making a very large allowance for friction, etc.

Mr. Dibben.—The calculations may be all right, but I suspect there would be practical difficulties in the way of arranging the pipes. Ship masters, too, have very strong objections to making holes in the sides of their ships. They are very much disinclined to adopt any alterations in their pumps. I have seen ships within a short time with the pump on the hurricane deck, so that all the water had to be raised twice as high as was necessary. There is nothing that mariners are more afraid of than getting their pumps

choked, as they are always liable to be from coal, dust, etc., and any new pump is subject to suspicion that it may be faulty in this respect. Some vessels have a well specially constructed to set the pump into, to prevent this danger.

The subject was farther discussed, and it was voted to continue it at the next meeting. The Association adjourned to the second Thursday in August. JOHN K. FISHER, *Secretary pro tem.*

AMERICAN INSTITUTE POLYTECHNIC ASSOCIATION, *August* 14, 1862.

Dr. WARREN ROWELL in the chair.

AERATED BREAD.

Prof. Seely.—The manufacture of aerated bread has recently much declined in London, England, and I should like to inquire if the aerated bread usually soon sours or molds, when kept three or four or more days after it has been baked.

Mr. Fisher.—I consider all bread best when fresh, and that the "best tasting food" is usually the best for any one. I admit that almost all our preferences, as to food, are cultivated tastes; and I regard the aerated as the best bread now in common use, and believe that it keeps good the longest; but hope every one will eat what he wants while it is fresh and best, and never let it sour or mold.

Mr. Dibben believed that aerated bread, made of good wheaten flour of grains in normal condition for seed, would sooner dry than mold; and that bakers could not work sour nor musty flour into it, because it would taste too plainly; and, hence, good tasting aerated bread is surety against damaged and sophisticated flour.

Mr. Fisher.—I believe that the reason of the London bakers giving up making aerated bread, was that it prevented them from using inferior or damaged flour, as well as prevented mixtures of beans, maize and potatoes, in what purported to be wheaten bread, as now much used both in this country and England.

Mr. Dibben.—I have always found that the aerated bread, as usually sold in New York, always dried, without souring or molding, when long kept in a dry place.

Dr. Stevens believed that about the usual amount of fermentation in our most marketable yeast bread was very advantageous to health, especially as it then digested much easier, and thereby prevented or relieved dyspepsia.

Mr. Enos Stevens admitted that the more any food is fermented or otherwise disorganized before it is eaten, the easier it will be digested in the stomach; but he had often noticed that partially disorganized food always produced tender members and tissues of the body, as feet that soon blister, hands that soon tire and falter, and brains often aching or con-

fused; and, therefore, he preferred and recommended unfermented food, as a requisite means of having good working limbs and all other members of the body, even if it did cost a little more labor of digestion.

Prof. Seely said that many things which the theoretic chemists had declared as not containing any nourishment, had actually subsisted men and animals exclusively for years, and intimated that animal life prospered best on certain materials, but when such materials cannot be obtained then their spontaneous vitality would seem to nitrogenize mere carbonaceous vegetable matter, and use it temporarily for growth and repairs, although not so rapidly and successfully as that which was natural nitrogenous in the vegetable state.

The Chairman said that dogs working on a tread mill to propel machinery did best when eating only ten per cent. of animal flesh, with the other ninety per cent. of their food the coarse flour and fine bran of sea biscuit bakery made into bread.

Mr. Fisher and Dr. Stevens gave other illustrations of the use and results of various articles of food.

Mr. Churchill intimated that the experiments in decarbonizing iron in reducing it from the ore, recently reported here, on further investigation, seemed not to attain more decarbonization in the preliminary process than was usual by the old process.

The regular subject for discussion was called up, viz:

Pumping.

Prof. Seely read the following communication from Mr. F. A. Morley, of Sodus Point, N. Y.:

MODES OF RAISING WATER.

What I propose to say relates entirely to the most common device for that purpose—the pump. In most of pumps, but more especially the single acting, the velocity of the column of water is constantly undergoing sudden changes; this is a great evil, as much of the power is expended in overcoming inertia, which, if it may be called friction, is by far the most important item of friction to be considered.

Most of pumps, as far as the writer's observation goes, are constructed without any regard to this important point, as, for instance, a pump will have a uniform bore of four inches throughout, and a valve of three inches diameter. Now, as the water moves through the uniform size of the bore, its velocity is uniform, but as it passes the valve its velocity must become suddenly nearly doubled, and immediately subside to the uniform velocity again. There are but few exceptions to be found to this style of pump, in the whole marine list.

Another point touching the inertia is the *terminations* of bore. It is evident that, if the ends of the bore are gradually enlarged toward their terminations, the fluid will gradually attain and lose the uniform velocity (or piston velocity) in entering and leaving the pump. (See Olmstead's Philosophy, page 293, section 429, latter part.)

Mr. Fisher inquired as to using gunpowder as a motive power for machinery.

Mr. Dibben.—It has been extensively experimented on, and found to be many times more expensive than steam.

Mr. Fisher proposed the "Making of Common Roads," as the subject for discussion at the next meeting, which was adopted.

Adjourned. ENOS STEVENS, *Secretary pro tem.*

AMERICAN INSTITUTE POLYTECHNIC ASSOCIATION, *September* 11, 1862.

Dr. R. P. STEVENS in the chair.

Mr. J. K. Fisher read a paper as to steering vessels by means of a rudder placed in the bow. The principal advantage claimed is that it would be out of the way of the screw, and the main difficulty is to keep it firm against violent waves, and to bring it from one side to the other in changing course. He proposes to hold and to move the rudder by means of a hydraulic press.

Mr. Babcock objected that a bow rudder would foul badly by drifts between the ship and rudder.

Mr. Dibben objected that it would be extremely difficult to handle a bow rudder with sufficient power and speed.

Mr. E——— exhibited a bolt made of wire rope, so as to be elastic, and especially not to break off while holding armor plates when hit, nor while fastening standing rigging.

Mr. Dibben thought that it would rust much faster than if all in one bar. The price of such bolts is $16 per 100 pounds.

Adjourned. ENOS STEVENS, *Secretary pro tem.*

AMERICAN INSTITUTE POLYTECHNIC ASSOCIATION, *September* 18, 1862.

Mr. JOHN P. VEEDER in the chair.

Mr. Fisher asked what was the speed of war steamers.

Mr. Dibben.—Probably ten knots when in fighting trim; and yet sometimes, in ballast, may attain thirteen or fourteen; and commercial steamers, with strong and favorable wind, sometimes about sixteen knots.

Prof. Seely explained the aspirator, an instrument through which water and air flow, adapted to aerate water, to produce cheaply a strong and steady current of air for the blowpipe, and to ventilate rooms, where a current of water is available to propel the air. A small stream of water enters the side of a larger perpendicular open tube, and, by its gravity, carries down the air in the larger tube continually, propelling out the air with great force from the bottom of the large perpendicular tube, and taking in more air all the time at its open top.

Mr. Bartlett explained the electro-ballistic machine, for testing the velocity of missiles from guns, etc. The principle of this machine is that

the missile, at a certain distance, by passing through an electrical target, liberates a body to fall, or oscillate as a pendulum; and at another certain distance, say one hundred feet, hits another electro-magnetic target, and clamps or stops the falling or oscillating body; and then the distance the body fell through indicates the time that the missile was passing the space or distance between the targets.

Locomotion in Cities and Suburbs.

Mr. J. K. Fisher.—Common carriers and liberal citizens take different views of street locomotion. The carriers look chiefly to profit, which, as they think, is most surely obtained by cheapness; liberal citizens look for some degree of comfort and decency, even though it be not consistent with extremely low prices. But while the carriers are uncontrolled, and left to the laws of trade, their accommodations will be as bad as their exclusive privileges enable them to compel citizens to endure.

In expenditures that depend on their own choice, such as in their houses and stores, the citizens generally are as lavish as could be desired. But in what depends on their representatives, or those who serve them as carriers, marketers, etc., there is a less liberal expenditure. The splendor of houses and stores is strongly contrasted with the shabbiness and filthiness of streets; and the improvements in the style and cost of buildings, within thirty years, is incomparably greater than the improvements in paving; and the same comparison may be made with respect to all kinds of public vehicles.

We in this Club should speak of these matters not as politicians may speak who fear to make themselves unpopular with those who tolerate the present condition of things, under the erroneous notion that they have to pay nearly the whole cost of them, and cannot afford to improve them. We should speak as men representing science, taste and progress. You will therefore excuse me if I don't tell you how a cobble pavement *is* laid, how an omnibus *is* managed, or bore you with a tame and dull account of what you already know, and would gladly forget. It will be quite enough if I say what is necessary for comparison between the barbarous systems that exist, and the system which has long been recommended by the best engineers in England, and by some of the best in this country.

First, as to dirt. The quantity of dirt made per hour by a horse is not known; but fifty-five loads were taken every night from Broadway, between Bowling Green and Union Square, when it was swept under the direction of Mr. Genin. The English engineers, in evidence before parliamentary committees, offered that the *comparative* amount of detritus worn from pavements and roads by wheels and the feet of horses was in proportion to the iron worn from the tires and shoes; or, if there was a difference from this proportion the blows of the feet caused more than this proportion of wear. On Macadam roads, with four-horse coaches, a pound of iron was worn from the tires in the same distance in which three pounds were worn from the shoes; hence it was concluded that three-fourths of the wear was due to the feet, and one-fourth to the wheels. Marniel ascertained and reported this fact, and Macadam, Forby and others agreed with his conclusion. On the London pavements, similar to the so-called

Russ pavements that are laid square with the street, a cab lost one pound from its tires while its horse lost seven pounds from its shoes. The cab at that time weighed 1,050 lbs., or about 1,350 lbs. when loaded, say a third of the weight of a loaded omnibus.

Taking as unity the dirt made by the wheels of a cab, we have the following as the relative quantities worn from pavements by the different modes of conveyance we have to consider. But we have to add the manure dropped by the horses, which was found by analysis to be a third of the whole dirt. The dirt worn from the pavement by a cab and horse being equal to eight, we must add four, making twelve,—one for cab and eleven for a horse. And in estimating for rail cars we may assume that one car does the work of three omnibuses, and that its wheels make no sensible amount of dirt. Therefore for

3 omnibuses equal to 1 car	9
6 horses, the dirt is equal to	66
Total	75
1 two-horse rail car	22
1 steam car	0

This comparison shows that the street railway system by horse power, as now practiced, makes less than 29 per cent. as much dirt as the omnibus system; and that steam cars, which are likely to be sanctioned by the legislature, will reduce to nothing the ordinary dirt; and I shall show that there need not be any sensible amount of dirt of other kind from them. So far as this part of the traffic is concerned, it is satisfactory as to the dirt nuisance; but we have goods traffic and private vehicles to provide for, and it is not pretended that these can be accommodated by railways: we are still required to keep up the dirty system for this part of the traffic, and are to be relieved only from so much dirt as is made by the cars and omnibuses.

I have long advocated iron flooring on the streets. No dirt could come from this floor; and the dirt thrown upon it could be easily swept clean off. On an iron floor a man could do more than a horse can do on the Russ pavement; but steam power is the cheapest, as well as the best; and I anticipate the use of steam wagons and traction engines for all kinds of traffic. And steam carriages and wagons have this advantage over the railway system, that they can be introduced without disturbance of the existing order, and can gradually displace horses, as horses and their vehicles are worn out.

On stone pavements, steam carriages will make some dirt, but not of the most offensive kind: it will be pulverized granite, without manure in it. I consider that a steam omnibus will weigh one-half more than a horse omnibus, and its dirt may be represented by $4\frac{1}{2}$, or $13\frac{1}{2}$ for a steam carriage equal in capacity to a rail car. The relative dirt will be:

By horse omnibuses on stone pavements	100
steam do do	18
horse rail cars	$28\frac{2}{3}$
steam do	0
steam on iron pavements	0

In support of the view that steam may be applied to this kind of traffic, we have, in the last number of the *London Mec. Mag.*, an illustrated account of the fifty-third traction engine built by Aveling & Porter, of Rochester. In this engine there are some good points. The steam-jacketed cylinder is in accordance with the practice of Watt, which has of late been revived, and recommended, especially by D. K. Clark, the best authority on locomotive practice. The steering gear is simple and effective; I believe Gurney was the inventor of it; it is shown in some engravings of his carriages. But it is not applicable for high speed and flexible springs. The whole arrangement, being without springs, is simple and cheap, but of course it is too slow for city traffic; and, from observation of a well built traction engine, I am of opinion that on soft roads a low rate of speed will be found disadvantageous, because there will not be sufficient momentum to pass over soft places.

I differ from Mr. Aveling, and from all the English traction engine projectors, in regard to gearing. This engine is geared to make twenty turns to one turn of the wheels. Let us consider this. I have calculated that the Great Britain locomotive, with eight-feet wheels, consumes five per cent. of its power in sliding its valves. D. K. Clark estimates that six per cent. is consumed in some locomotives, whose wheels, I presume, are smaller; and his authority corroborates my estimate. Now, if we keep the same boiler and the same speed on the rails, but use four-feet wheels, we double the friction of the valves, and so on, until, when the wheel is reduced to 4.6 inches diameter, the engine will barely slide its valves. Now, if, instead of gearing, this traction engine had reduced its wheels, they must have been 3.9 inches to get the same number of turns per mile that the engines now make. But the speed is one-twentieth of that of the Great Britain; hence the parts are smaller, and the valve smaller, and the friction proportionably less, but still it is 6.15 per cent. of the gross power. If four-feet wheels, with direct action, were used, the valve friction would be .005—one-half of one per cent, a saving of .0565—or nearly $5\frac{2}{3}$ per cent. of the gross power; and the loss of steam in the ways and clearances is much greater than it would be in a large cylinder working slowly; and the friction of piston, crosshead and gearing consumes a large per centage of the power. Mr. John A. Reed, of this city, built an engine, some years ago, in which some complex gearing was used; and when he removed it, the engine could draw more, although the engines made fewer turns per mile.

I hold that it is best to use wheels of moderate size, with direct connection—that is, a turn of the wheels to each turn of the engines. There is but one objection to this—the loss of heat from the cylinders. But I design to jacket the cylinders, and to lag the jackets, and in some cases to put the cylinders close to or within the smoke-box; in this way I believe I can avoid much loss of power from condensation.

In another point I differ from them. Instead of spikes, spuds and other contrivances to get adhesion, I put as much as I can of the drawn load upon the drivers, making their rims broad enough to bear whatever weight is necessary for adhesion with smooth tires.

Here is a drawing representing a two-wheeled pleasure carriage, con-

nected to a steam wagon, the connection being made to a bar or transverse spring under the driving axle, and the total weight of the drawn carriage being about one-half on the driving wheels, but not resting on the springs of the steam carriage, and therefore not affecting the relative level of the engines and driving axle.

The act of parliament wisely prohibits projections on tires that work on public roads; and it is not at all necessary to use them, except there is greasy mud or ice or snow. On clean roads the adhesion is greater than on railways, so much that the wheels of my steam carriage, which would slip with 130 pounds on iron rails, do not slip with less than 180 pounds on pavements, and have gone up a hill over fresh broken stone with 190 pounds pressure, and without slipping.

Boydell's engine has what is called an endless railway, and its friends claim that this secures it against slipping. I don't see how this can be; the wheels run on iron rails, without other hold than common locomotives have, unless the cycloids take the strain, and are made liable to be broken by it. If this be the practice, I think the repairs will cost too much.

For city traffic, except what ought to be carried at a speed equal to that of passengers, so as not to hinder passenger carriages, I am confident that gearing is not desirable. But if you wish to move boilers, columns, buildings, and other bodies of over twenty tons, then it may be used; and an advantage may be gained which has not yet been credited to steam—you may move at a speed much slower than that at which horses work to the best advantage; you may move at half a mile per hour, or less, and thus avoid injury to pavements by jolting, and likewise avoid injury to your wheels; and at the same time you may work with a small boiler. Such slow vehicles should not be allowed in the principal thoroughfares except at night.

The cost of haulage by traction engines is given in Young's work entitled "Steam on Common Roads." The reports in this book show that the cost is from a third to half the cost by horse power, at two and one-half to three miles per hour,—that is, at the speed most advantageous for horses. As the speed is made greater or less than this, the economy of steam power, compared with horses, becomes greater.

Second, as to noise. Horses' feet make more noise than the wheels of light carriages, but less noise than the wheels of carts and omnibuses, and about as much noise as the wheels of rail cars. The steam blast in locomotives makes less than the noise of a tenth part of the horses that would be required for equal work. But the steam blast may be silenced, or dispensed with, and a fan substituted. The dummies of the Hudson River railway condense their steam, and use fans. Grice & Long's steam cars use large cylinders, and make two turns to one turn of a thirty-inch wheel, so as to expand the steam to a low pressure, and subdivide it into very small puffs, and thus reduce the noise to an insensible amount. I adopt the device of Gurney, which is, to exhaust into a chamber of ten or twelve times the capacity of the cylinder, from which the exhaust flows in a steady current like air from a smith's bellows, and makes no noise except on steep inclines. It is generally believed that this arrangement involves more back pressure than the usual puffing blast; but Mr. A. F.

Smith, who tried it on the Lehigh Valley railway, considers that its loss by back pressure is not sensibly greater than the loss by the usual blast-pipe.

There is a relation between gearing and the steam blast. Mr. Wm. S. Hudson, superintendent of the Rogers' Locomotive Works, approves of gearing for the traction engines, to such extent as to make a quick succession of small puffs, rather that a slow succession of large puffs, because the quick puffs keep a constant and nearly equable current of air through the fire, and the strong puffs, at long intervals, alternately disturb the fire, and throw out coals, and then leave the draft weak until the next strong discharge of steam.

Now, by the plan of Gurney, the exhaust chamber may be made to equalize the draft, if it be proportioned to the time between the puffs. If the engine has large wheels, and move slowly, the exhaust chamber must be large; if it move at moderate speed, a small chamber will suffice; if it make four or five turns per second, no chamber is needed. Therefore, the complexity of gearing is not necessary to equalize the draft; it is not so effective an equalizer as the exhaust chamber or the fan, nor is it so silent.

Lifting sparks is an evil to be carefully avoided in street engines. It is a nuisance that ought to prohibit any engine which is not nearly free from it. It is to be avoided, partly, by avoiding such fuel as wood, charcoal and gas coke, and by using solid anthracite, and hard coke that is made expressly for locomotives. When I burn charcoal in my steam carriage at night, it throws out sparks to such an extent as to light the road sufficiently; and when a steam fire engine which burns wood, has worked an hour, you may see the pavement strewn with charcoal all around it.

It is also partly avoided by a large grate and a deep fire box. The dummies on the Hudson River railway have fire boxes forty inches deep. I design them from thirty to thirty-six inches deep for the small boilers of steam carriages; and my observations have been sufficient to satisfy me that large grates, deep fire boxes, heavy and tough fuel, and a steady draft, will make a cleanly engine; and that the dirt from thirty steam cars will be less than the dust worn from the pavement by one horse.

Third: as to smoke, or carbonic acid and nitrogen. The seven horses of an omnibus, in the twenty-four hours, mix into the street air more carbonic acid than a steam omnibus would mix into it, and the nitrogen is in proportion, because the car would project its gases upward with such velocity that they would soon be carried over the city, whereas the horses blow their breath downward, and mix it with the air we have to breathe. The gas nuisance is, therefore, much the greatest with horse power. As to smoke, it is a disgrace to the railroad companies that they have allowed it in cities. They had only to use coke, while in the streets, in order to avoid smoke; and, had they done so, there would have been no objection to their using locomotives in the streets of New York, as they were allowed to do in Brooklyn until their indecency disgusted the people, and the people drove them off. On rails, and still more on iron floors, the friction could be lessened, so that the power, and therefore the gases, would be reduced to a third of what they must be on stone pavements.

I contemplate certain small improvements which will lessen the consumption of fuel in the streets. I design to heat the water at the stations up to the temperature of the steam, and fill the boiler at the stations, and not feed it on the way. This will save a quarter of the fire on the road, and a quarter of the boiler surface, and the use of pumps, and will make the engines, on the whole, lighter. A Giffard injector will be carried, but never used except in an emergency. By using all such means that are conveniently practicable we may reduce the noxious gases to much less than they are with horse power—less than half on stone pavements, and less than a sixth when horses are superseded, and we have iron floors.

The dummies condense their steam. I have in this Club suggested that in the winter we may, in a future and more civilized age, remove the snow from the streets as soon as it has fallen, and preserve it to condense steam in summer. Mr. Wm. A. Lighthall, who is known as the designer of the engines of several first class steam vessels, has an air-surface condenser which he believes will be efficient on steam carriages. And we have engineers, both here and in England and France, who believe that compressed air may be used instead of steam, when machine vehicles have come so much into use that compressing stations can be supported. But, in the beginning, we must be content to keep the steam invisible, and shoot it upward so that it may be blown away from the city. This is done in locomotives that keep their steam dry. Steam-jacketed cylinders help to do it; superheating steam helps to do it; and the heat wasted in upright tubular boilers helps to do it; that is, the exhausted steam, mixing with hot gases in the chimney, becomes so hot as to dissolve in the air without becoming cloudy. If you watch the cloudy steam from an engine that does not exhaust into a chimney, you will see that it soon dissolves into the air, and ceases to be visible; but locomotives that keep their steam dry, send it out so hot that it dissolves in the air before it has time to become *vesicular*, or cloudy.

Fourth, as to danger. Were I to build a steam carriage that would be frightened by a wheelbarrow, or a push-cart, or an elephant, or locomotive, or by any strange object, the ultra conservatives would regard it as a serious objection to my carriage, and would not allow it to run, at the risk of killing people. But when an inexpert driver fails to control a timid or even a frisky horse, that is nothing new, and therefore they don't object to it. I claim that the steam carriage is, in this respect, safer than the horse; it cannot be frightened, and has no will of its own. If your horse frightened my carriage I would agree that it should be forever prohibited; why, then, should you not allow that if your horse has been trained in cruelty, and is afraid of every strange object, he should not be suffered to go in crowded streets where he may at any moment kill infirm people? I should be glad to ask Mr. Rarey if he could not easily train horses so that they would consider locomotives rather agreeable companions. I think he could. I know it has been done; and I think he could teach others to do it; and the small minority of horses that would be frightened by steam carriages could easily be got to like them. It is an exaggerated apprehension of the disputatious opponents of every new idea, that they do not themselves originate, and not the timidity of well used and well trained horses,

that has excited so much objection to steam carriages and rail cars, on the assumed but not proven ground that they are less safe than horses. If steam cars should displace all the horses now working the passenger traffic, all the accidents from the fright of cart horses, fancy horses, and all other horses remaining in use, would be less than the accidents now occurring from the fright of the horses that would be displaced by the steam cars.

The other danger apprehended is the explosion of boilers. Col. Maceroni, who built a steam carriage that ran very efficiently, in reply to an inquiry as to the safety of his boiler, placed himself and his two children on the carriage, fastened down the safety valve, drove the fire, and actually bursted the boiler, and that without disturbing anything but the ruptured part. Jacob Perkins frequently had his cast iron tubes burst under 750 pounds pressure, but never had a brick thrown from the furnace, and it is a well established fact that high pressure steam does not scald. I have had water from a high pressure boiler blown into my face without scalding. The principle of subdivision of a boiler into small compartments may be carried so far as to secure absolute safety.

Some locomotive boilers on the New York and Erie railroad have barrels forty-eight inches in diameter, made of quarter inch plates, single riveted, and have been run whole trips with 200 pounds pressure. I design boilers for steam carriages twenty-four inches in diameter, of quarter inch plates, double riveted. The double riveted joint was found by Fairbairn's trials to be stronger than the single riveted, in the proportion of 70 to 56, or 10 to 8; hence, my boilers are two and a half times as strong as these locomotive boilers, and will bear 500 pounds as safely as they will bear 200. But I don't propose to work them above 150 pounds. With this excess of strength they are no more liable to burst than a building is to fall.

I have tried the subdivided tubular boilers, but have not succeeded in making them produce steam well, and I find that I can vaporize more water with a common boiler of 160 feet of surface, than Ogle & Summer's did with 250 feet in a boiler of the subdivided kind. It is, therefore, expedient for me to use abundance of metal in the shell, rather than attempt to improve the boilers that are naturally safer, while I have not adequate capital. When I have sufficient capital I intend to experiment upon them, and to neglect no reasonable means of safety. Two engineers of acknowledged talent have patented steam generators that are unquestionably safe, and will, I believe, make steam fast. They have promised the exclusive right of them for common road and street locomotion to a company, if I can form one with adequate capital.

Fifth, the cost. The average cost per mile, of locomotives on the Illinois Central railroad, for seven years, was sixteen and two-third cents; on the New York Central it is from twenty to twenty-one cents, wood being the fuel; on the Baltimore and Ohio fifteen cents, with coal. The small tank engines built by Danforth, Cooke & Co., work for six cents per mile. The cost per car per mile, for haulage, is less than two cents, at a speed of over twenty miles per hour. The contract price of drawing cars by horses at less than six miles per hour, on the Hudson River railway, has been twenty-five

cents per mile; and the cost on the Harlem railway is greater, they keeping their own horses. I estimate the cost of a steam omnibus at eleven cents per mile, and of a steam car at eight or nine cents. I think there is a general opinion that steam will be much cheaper than horses, even at the speed allowable in cities; and that the reason it has not long ago been introduced has been political rather than economical. At least, so far as I have heard the objections of men in their management, they have been mainly on the ground that the conditions of their grants prohibit their using steam, and they have had no hope of getting those conditions altered without enormous sacrifice of money, and principle, and character. I know nothing of the justice of the charges of bribery that are current against legislators and councilmen; but the belief that these charges are just has discouraged men from attempting to introduce steam cars, and I have myself been prevented from raising capital to build a steam omnibus, by the refusal of a license either for an omnibus or a hackney coach. The foundation of the financial difficulty is this political difficulty. It was so in England. Not until within three years has there been an act of parliament to protect steam carriages against arbitrary tolls, and that bill limits their speed to ten miles per hour in the country, and five miles in the cities, while horses may be driven at their highest speed—twelve or fourteen miles per hour—the great advantage of steam is denied to it. Under such discouragements capitalists have declined investments. Abundant capital was subscribed, on condition that parliament should pass a bill to place steam carriages on equality with horses; but the Lords rejected two bills which the Commons had passed, and the matter was abandoned in 1835, and not again agitated until 1858; and even then the meager relief was not granted until the third year after it was asked.

It has been supposed that we in this country are not at liberty to use steam carriages without special leave. Street railways, whose privileges are special, cannot use steam until they have further privilege. Omnibuses of any kind must have licenses; and it is now difficult to get licenses for a new line. Hacks must be licensed; and the license clerks, for want of judgment, or supposed want of authority, may refuse to license steam; but private carriages need no license, and may be run by steam, and there is no law to hinder them, unless it be the common law against nuisances; and if this law is appealed to the complainant must prove that it is a nuisance. It must be clearly shown that the consequence complained of is not the result of imperfection that may be remedied, want of expertness that practice may supply, or of fright of horses that proper training may prevent. The distinction between English and American law and that of despotisms, is that in despotisms the subject has no liberty but that which is specially granted, but in free governments the subject or citizen has entire liberty in all things, except there are specific laws restricting it; and the court cannot stretch the law to make it reach a case not yet legislated upon. Hence, if steam carriages are built by individuals, or by clubs, and do not carry passengers or goods for hire, they can be run as they are now in London. But without hire they may not be deemed a good speculation,—so people view it; but I should be glad of a chance to show the contrary to those who want wagons or carriages for

private use, or to gentlemen who may like to form clubs, and have private club carriages that will carry them with superior comfort and speed to their residences within twenty miles of the city.

There is a financial difficulty, which, although aggravated by the political difficulty, is distinct from it, and increases with the expiration of every steam carriage patent. It is the want of protection against the competition of all the plans that are free to be built at mere manufacturers' prices, and will be built as soon as the labor and outlays of inventors and their coöperators shall have convinced common carriers that steam can work cheaper than horses. In England, in 1832 to 1840, there were six or more different plans of steam carriages, nearly equal in efficiency and economy, which were rivals to each other, and threatened competition that would preclude profits commensurate with the risks incident to a new enterprise of this kind. These plans are all now free; therefore, they are more discouraging than when they were all patented. I have added to the invention a new element, which I deem indispensable to the most efficient and economical results on uneven roads. A first class engineering estabment in Philadelphia fully indorses my claims, and would have engaged in manufacturing on my plan,—making special tools for the work, had not their business suddenly become pressing in consequence of government work. But capitalists do not foresee mechanical results; to satisfy them I must first build a carriage, and run it effectually. That I have done; six carriages on my plan have been built and run satisfactorily, attaining speed of 18 and 22½ miles per hour. Then arose a question—which I foresaw, though capitalists did not—it was this: Will not Gurney's, or Hancock's, or Ogle's, or Maceroni's, or Russell's, or Hill's, or Anderson's, or Moudslay's, or Field's, or Roberts', or Rickett's, or some of the untried plans, now free to compete, rival yours, or surpass it? To answer this question satisfactorily, I must build a carriage on every one of these plans, and beat every one of them, in a race, and in a year's wear, and show by attested books that mine is the most economical as well as the most powerful. Then another question will arise: Have you done justice to these rival plans? Have you not puposely vitiated proportions, or jockeyed them so as to beat them? Will you give us a bond of indemnity, so that if we are hereafter beaten by these plans when they are built and improved by the Rogers' Locomotive Works, and all the other locomotive builders, we shall be reimbursed? There is no end to such caviling. If you indulge men in such illiberal fears, they will never cease to imagine difficulties. All we can say is, if you insist on assurance of profit, you must be content with current rates of profit—eight or nine per cent.; but if you will liberally hazard your capital and labor, you may honestly desire great profits. Your best security is, if you are diffident of your own engineering judgment, to consult engineers, and pay them for their opinions, and act upon them.

I have agreed with a majority of the present steam carriage builders and projectors in this country, to assign their patents and inventions to a company, if it can be formed with sufficient capital, so that we may not oppose and hinder each other, as the English did thirty years ago, and are doing now. I do not deem it expedient now to explain my plan publicly,

but I invite such as may wish to invest talent or capital to confer with me privately, and judge whether my views are such as will warrant them in coöperating with me.

Leaving now the discussion of the parts of this subject, and looking at the whole, as if all the interests were united, or as if we had a government, and the public interests were regarded, I may express my views of the relative economy of the old system, and the amended system now agitated, and the system which I propose, by saying that the introduction of steam cars, as now likely to be sanctioned by the bill before the legislature, would, in the passenger traffic, nearly but not fully attain the economy that would result from the system I advocate; but it would in no degree improve the freight traffic, the hackney coach, private carriage and wagon traffic. It would involve the maintenance of two conflicting systems —a system of rails, injurious to common wheels, and obstructive, and incapable of turnouts, and it would still leave the streets in a state of uncleanliness inconsistent with the luxury of private houses, and in no respect economical even to the poorest of the people; on the contrary, a cause of injury to the clothing of the poor, and a severe tax upon them in every way. Even if the notion kept up by vulgar demagogues were true, that the laborers produce all the wealth, and pay all the taxes, still it would be best for the laborers to pay for clean streets, although the cost should be double what is now paid for filthy streets; but it is agreed by engineers that iron roads and steam would cost less than a quarter of what is now paid for the barbaric system of animal power, and roads suited to that power. Three cents a car per mile, compared with twenty-five cents a car per mile by horse power, warrants the exhibition of a greater saving than this. But the capital of the wealthy is the main element of the production of wealth; the machinery in England, in 1825, produced more than the whole population of the world could produce without machinery; and since that time this kind of capital has vastly increased, in this country as well as in England. Whoever teaches this doctrine, that tends to embitter the minds of laborers against capitalists, is either a vulgar speculator or a malignant knave. The real truth is, that in cities where trade is increasing, the taxes fall ultimately on the owners and lessees of real estate; every improvement is their speculation; if it is judicious, it adds to their wealth; if injudicious, it diminishes their wealth. It is my opinion that a board of talented civil and mechanical engineers could so improve Broadway as to add one-half to the value of the property upon it; and that in their improvements could be included an iron floor and a system of steam conveyances, controlled by a liberal company, or by a good government.

I deem it my duty to speak of the course pursued by the Broadway proprietors, in thwarting the schemes of the railway proprietors. In the beginning of that attempt to plant a great excrescence that should prevent a scientific progress, the proprietors appealed to the people, and by their votes got a new charter adopted by a great majority. Then, instead of manfully and liberally nominating good candidates for the council, they disgraced themselves, and betrayed the interests they volunteered to defend, by selecting from the two tickets nominated by the managers of the two

parties. That was the last of their efforts. They had promised that when the would-be monopolists were defeated, they would propose a "relief" for Broadway. All they ever proposed was that the omnibuses should carry change-takers, as the cars do. I have little sympathy with men of wealth who have so little liberality, and who, though claiming to be gentlemen, seem to be unconscious that gentlemen have peculiar duties, and to suppose that they can act *merely* for their own interest and pleasure, and yet be honored more than other men. This class, like those who profess to be the elect in the religious world, look for benefits and enjoyments for themselves with the least exertion of their own. I understand that true Christians are to bear the burden of reforming the world, for the benefit of the world, being prompted thereto by the disposition which distinguishes them from sinners; so I understand that true gentlemen are to bear the burden of promoting liberal improvements, for the public good, being prompted thereto by the taste and liberality which distinguish them from the commonalty. I regret that a sense of duty constrains me to add, that I do not see in American gentlemen so vivid a sense of this duty as I see in English gentlemen, and especially in the conduct of the Broadway proprietors I do not see enough of this liberal spirit to entitle them to higher esteem than is due to respectable tradesmen.

I know nothing as to the truth or falsehood of the charge that George Law and others have bribed legislators to confer upon them a monopoly of the passenger traffic on Broadway and other streets; nor do I know what prospect the proprietors have of defeating the scheme altogether, or getting into the city treasury the value of the grant, or getting a low rate of fare for the benefit of the people; but I see in some of the proprietors a desponding air, which evinces anticipation of total defeat; and, from this appearance in those who know the means applied on both sides, I expect that the grant will be made to the applicants, without regard to the offers of the proprietors, or their remonstrances and legal proceedings, and that the courts will never annul or impair the grant. They are either sold or given away. They may ascribe their discomfiture, and the depreciation of their property, to their own lack of liberal enterprise.

Yet there is a means by which they can retrieve their defeat, and overpower the encroaching speculators. They can yet get possession of a power that will underwork and render profitless all that the grantees can oppose to them. But if they wait until the rails are laid, and steam is at work upon them, and the talent is employed by their opponents, then it will be too late for them to prevent the principle of cheapness from banishing elegance, and even decency from their street. The crowding and discomfort of the rail cars now in use, the presence of smoky and noisy locomotives, the dirt that a sordid government will not prevent, all preindicate that Broadway will assume a working character, and lose its former character of elegance and fashion. And within thirty years the Fifth avenue will be extended downward, and built in superior style, and Broadway will be eclipsed as Pearl street has been eclipsed. If the proprietors fail to avail themselves of the talents of civil and mechanical engineers, architects and others who have applied their faculties to the solution of this problem, and rely on their own crude notions, conceived

while their minds were occupied with business that required all their attention and abilities, it is scarcely disrespectful to them to say that they will produce a contrast extremely disadvantageous to their own property.

But it is hardly to be expected that they will come to us, or to me, or to any mere projectors. We must go to them; and it is useless to go until we can propose to build and guarantee, or in some way to demonstrate our theories. Moreover, as the case now stands, since the new arrangement with the Harlem railway, it is necessary to show that they can get leave to run steam. This can be shown most conveniently by building some kind of vehicles for use on pavements and common roads, or for amusement. A few steam cabs, of the design shown, to run in the Central Park, would exhibit and introduce this power, and at the same time would be a profitable speculation.

As a preliminary to the construction of a cab, it would be prudent to practice with my large carriage until we can determine the power required on different roads. To fit up this carriage in the style of a pleasure carriage, so that it will be allowed to earn money in the Park, and to make the necessary exhibitions, would require from $600 to $1,000; $1,000 ought to be ready, not necessarily to be spent. The exhibition of this carriage would probably satisfy people as to whether it is expedient to follow up the scheme, or to abandon it. Now, I invite all present to confer with me as to the investment, in this enterprise, of money, talent, or whatever else will promote it. There is already promised to it a great amount of engineering talent, and several patent rights. I have for years represented that the English were defeated by the opposition of inventors against each other, and that we are likely to be defeated if we repeat their error; and that it is our duty, as members of a liberal profession, to unite our inventions so as to make the best whole, and to unite our means so as to promote the invention most efficiently and rapidly. If we take this liberal course, we may hope that liberal men will assist us by contributions of money, in such ways as may suit their dispositions, abilities and interests. One may *give* a few dollars, to see an interesting and probably useful experiment; another, instead of giving a little, may *hazard* considerable; and another, who has nothing but his talent and leisure to spare, may contribute advice and influence.

The general condition I have proposed, and which is thus far accepted, is that the profit shall be divided, by disinterested and skillful judges, so that every one who assists shall receive what the judges deem his due, after there has been time to learn the relative merit of his invention, capital or other service, by fair and full trial.

I have found many who say that this condition is honorable, and they will accept it; if they receive less than what they deem their due, they will make no complaint, and entertain no unfriendly feelings towards their associates who have been more fortunate; and they also consider that the profit likely to result from united effort will be so much greater than that likely to result from competition, that if the most deserving gets but half his just due, he will be better off than if he had struggled in competition, with all the success that sound judgment can anticipate from this invention, now a century old, and modified in many different ways, and mostly free to

be built at workmen's prices. For an invention thus circumstanced there is no reasonable hope of such encouragement and reward as nations intend to bestow by patent laws, except in the union of the few improvements remaining to be made, and of the talent of liberal experts, and the liberal hazards and donations of those who recognize the principle that gentlemen have special duties, one of which is the duty of promoting improvements that are not understood by the multitude who toil for their daily bread; that will not be promoted by the illiberal, so long as they can expect others to bear the whole burden, while they themselves have the benefit; and that are of most consequence to those whose tastes are most cultivated and susceptible.

It would be just to appeal to this liberality alone, for pure donations, in such a case as this, in which is involved the cleanliness, and health, and comfort of the home of most of us, and the present fate of an invention believed by the best engineers in the world to be as important to small traffic as the railway is to large traffic; but it is better to ask for large investments than for small donations, because, so far as the public welfare is concerned, ten dollars invested is better than nine dollars given; and because the chance of profit, as in cases of insurance, and of planting, is a good reason for hazardous outlay.

But I regret, for the honor of some who are gentlemen externally, that I have been discouraged by an unwillingness to submit their interests to arbitration. They prefer to bargain beforehand. Yet they say it is impossible to bring about an agreement between inventors, or between several inventors and the capitalists whose power is indispensable. They would sit over paper representations of a machine not yet tried, and bargain about its merits and value; and in that game of skill would win as much as the necessities of their antagonists would constrain them to yield; yet they would not trust to the decision of skillful judges, made after the merit and value of each part and service has been proven by thorough trial.

We Americans are sometimes indignant when we read English writings in which gentlemen are contradistinguished from tradesmen, and are commended for the principle which restrains them from receiving, except as an acknowledged gift, any value for which they do not render an equivalent; and tradesmen are condemned and despised because they get all they can; because they will buy a widow's house for half its value, and sell it to another widow for double its value, if they can, and boast of it as a "splendid operation;" and will revel in millions gained by the invention of a Crompton, while Crompton dies in poverty, and his children are so poorly clad as to be ashamed to appear at the inauguration of the statue raised to their father's memory. We claim that merit, not pedigree, makes the gentleman; that politeness, honesty, and a few such qualities, make the gentleman; but it almost seems as if we considered that he may do what he wills with his own; hoard or squander his own money; neglect the public affairs of his country, State and city; crack jokes at the expense of inventors; condemn them as visionaries to cloak his illiberality in declining to coöperate with them, not for their exclusive benefit, but for the public benefit; and yet may claim equality in merit and honor with those

he calls aristocrats, who recognize as duties what he treats as little different from almsgiving. Now, it is time for us to consider whether our institution has not been retarded by thus refusing honor where it is due, and bestowing it where it is not due. Had we fulfilled these duties of gentlemen, thus understood, might we not have had cleaner and better pavements, better omnibuses and rail cars, and other comforts and luxuries, instead of civil war and the prospect of burdensome taxation, if not of evils incomparably worse?

In this sense of the terms I use, I condemn the objections of those who discourage the coöperation I propose, by saying that inventors will not agree; capitalists will not back them; professional engineers will not, in their way, help to perfect plans; and that competition is theory, and individual enterprise is the force. I have studied this subject as thoroughly as any one I know; and I predict pecuniary losses to each and every invention now in the field, if this illiberal course is persisted in. But if a liberal union is formed, even with a small capital, I predict that it will be rewarded as governments intend it should be; it will not fail to share in the benefit it confers on mankind.

Mr. Dibben.—I think, Mr. Chairman, there is no subject on which a little scientific information spread through the community would be of more value than the construction of highways. A large portion of the labor devoted to the construction and repair of roads might be more wisely directed. In New Jersey there are long pieces of sandy road which might be made perfectly hard and smooth by the application of a small quantity of clay and marl to the surface, and both the clay and marl are to be found in abundance in the immediate vicinity. In some places the road has been made hard by the droppings of marl from the carts as it was being carted from its beds to the fields for manure. Near Rondout, in this State, is a road a mile and a half in length, in which a smooth track is formed for each wheel by laying flat stones, the track between for the horse being formed of gravel. The difficulty of keeping the wheels on these flat stones prevented this road from being successful.

The Chairman (Mr. Veeder).—The managers of the plank road running from Albany to Cherry Valley tried several experiments which furnished a good deal of instruction in regard to this class of roads. They first planked the road with hemlock four inches thick, and when the hemlock planks wore out they laid down beech plank three inches thick. Afterward the whole road was planked with oak three inches in thickness. It was found that the hemlock lasted seven years, the beech has now lasted four years and is still good, and the oak plank in less than three years was all decayed. Experience has shown that where there is travel enough to wear out a plank road it will prove profitable, but if it rots out it will not pay. I have had some experience in road making for myself, and I am satisfied that the matter of most importance is thorough draining. Some years since I had charge of the work of repairing a road in which there was a very soft, bad place at the foot of a hill. I had the earth removed to the depth of some two feet and coarse stones thrown into the bottom of the trench, covering them with gravel. This spot has ever since been the best portion of the road. I would suggest the use of drain tile, laid in

lines across the road. If even the frailest of drain tile were buried only eighteen inches under the surface, I think there would be no danger of its being broken by heavy wheels.

Mr. Stevens.—On the steep hills in Vermont experience has led to the same system of thorough draining recommended by the Chairman. The track is excavated to the depth of three feet or more, loose stones are thrown into the bottom, and these are covered with gravel.

After narrating the manner and date of the construction of many roads, it was conceded that the following were the main circumstances in building and maintaining good roads:

First. That the road-bed be underdrained at least two feet deep or more.

Second. That at least sixteen inches deep of stones, not over five or six inches in their largest diameter, be laid in first, and then about six or eight inches deep of stones, broken to fall through a two and a half inch ring, be laid over the bottom sixteen inches deep, and that this finer broken stone be overlaid with gravel between the fineness of chestnuts and pears. But where the soil is very silicious or basaltic, there it is better for the surface to have a little coating of limestone, or oyster shells, or clay.

Third. After the road has been constructed it should always be kept well underdrained, and a very gradual drainable surface secured.

But where a cheap road must be built in a very short time, Mr. Veeder said a plank road would do very well for a short period, if there was travel enough to wear it out before it rotted out.

Across the swamps of muck, etc., a little browse, then clay or lime, and finally a round, gravelly surface may be easiest maintained, if it is well drained on each side of the road.

On sandy roads, clay or lime will soon make a good surface for dry weather.

Mr. Dibben.—Mr. Chairman, before we adjourn we must select a subject for the next evening.

Prof. Seely.—Mr. Chairman, the use of petroleum for fuel is occupying a good deal of attention at the present time, and in connection with this I should like to see discussed here the employment of compressed air in furnaces. Perhaps the whole idea may be embraced in the phrase, "Fuel in the Arts," and I move that that be the subject for the next meeting.

This motion was carried, and the Association adjourned.

ENOS STEVENS, *Secretary pro tem.*

AMERICAN INSTITUTE POLYTECHNIC ASSOCIATION,
September 25, 1862.

Dr. R. P. STEVENS in the chair.

FUEL IN THE ARTS.

Prof. Seely.—The cost of power, of iron, and of many of our most important materials is almost exactly measured and controlled by the cost of fuel. Indeed, the cost of fuel is an element in the cost of everything we

manufacture. Now, the fact that in our very best regulated plans of using fuel we seldom realize more than one-twentieth of its actual value, and in our ordinary operations not one-hundredth, shows how much improvement is to be desired and to be striven for. These truths are well known, and the question of fuel is discussed everywhere. In our club it is quite threadbare, so that I need to make the explanation that I introduced it only to bring out opinions on the new system of using fuel, illustrated by Siemens' regenerator furnace, and the new material for fuel, rock oil. (A brief description of Siemens' invention was here given.) In this furnace it is to be observed that the coal produces no more heat than in other furnaces where the combustion is equally perfect. Also, by the use of water and the water gases (hydrogen and carbonic oxyd), the total heat is not increased; the coal is, in effect, partly converted into water gases, which burn and give the heat which otherwise would come directly from the coal. Coal and water are fed at the stoking place, and the solid coal and liquid water expand into the combustible gases—carburetted hydrogen, hydrogen and carbonic oxyd—and pass on to the spot where they are to be completely burnt. The advantage of this transportation of the coal lies in the fact that the burning of the gaseous products can be more easily controlled, and the heat can be more directly and completely carried to the point where it is useful. The novelty of Siemens' furnace is, however, his regenerator, by which the heat from the otherwise waste products is preserved and brought again to the working point. It is also evident that this waste heat of the regenerator is so added to that of the gaseous fuel that the intensity of the working heat is greatly increased, a fact of great consequence in many industrial operations.

With reference to rock oil I will only remark that although its cost by weight must always be much greater than that of coal, yet for many purposes it will be much cheaper, for the reason that the heat it gives can be more completely utilized. Although it costs fifty times more than coal, yet if it does fifty-one times more work, it is plain that it is cheaper. Later in the discussion I will present some new methods of burning it.

Mr. Fisher.—I have made here on the blackboard a rough sketch of the apparatus invented by Mr. Clark, for burning the smoke in locomotives in which bituminous coal is used. A number of small openings, usually fourteen, are made in the furnace, and small jets of steam are blown through these openings, carrying currents of air with them. This air mingles with the gaseous products of combustion, and burns them. It was found that this plan worked very well on locomotives where steam is usually carried at a pressure of one hundred lbs. or more to the inch, but when the attempt was made to apply it to marine engines where the pressure is only thirty lbs. to the inch it did not answer so well; there was too much steam in proportion to the air. Even in the locomotive engine the steam must tend to reduce the temperature, as it enters the fire box at some 300°, while the burning gases are not less, probably, than 2,500°.

It has occurred to me that the vapor of petroleum might be blown into the furnace in place of steam, and thus the heat might be considerably increased. A separate boiler might be used for evaporating the petroleum, and the jets arranged in the manner adopted by Mr. Clark. Where petro-

leum is to be employed as fuel, I suggest this as a good plan for using it.

Prof. Seely.—I would ask Mr. Fisher what he expects to gain by this arrangement?

Mr. Fisher.—I expect to avoid the reduction of temperature which results from the use of steam. I suppose the combustion of the smoke will be quite as perfect, or perhaps more so, and that the heat will be greater. It is known that the temperature in the boiler flues is much lower than in the fire box. Experiments have shown that a foot of heating surface in the flues is worth only about a third as much as the same surface in the fire box. If a higher heat can be imparted to the gaseous products of combustion before they enter the flues, a larger quantity of steam can be generated.

Mr. Dibben.—I think that Mr. Fisher is right and that his explanation might be made more full. If the temperature of combustible gases, however thoroughly they may be mixed with air or even with pure oxygen gas, is reduced below the burning point, combustion ceases. It has accordingly been found that the old plan of lining fire boxes with fire brick is better than leaving the iron walls exposed. Whenever the gases come in contact with the comparatively cold iron they cease to burn. Anything, therefore, which tends to reduce the temperature in the fire box, tends to prevent a perfect combustion.

The speaker then made a drawing on the blackboard and described Siemens' gas furnace, the same that was explained so fully by Professor Faraday.

Mr. Dibben concluded by expressing an opinion of the very great value of this invention, saying that Mr. Siemens deserved the highest credit for pushing it through to practical success; and that it was satisfactory to learn that this inventor is at least enjoying a reward for his inventions.

Prof. Seely.—I indorse what Mr. Dibben has said in relation to the value of Mr. Siemens' furnace, and I have no doubt that it will come into very extensive use throughout the civilized world. I regard it as a very great invention.

The same subject was continued for the next Thursday evening, and the Association adjourned.

ENOS STEVENS, *Secretary pro tem.*

AMERICAN INSTITUTE POLYTECHNIC ASSOCIATION,
October 9, 1862.

Dr. WARREN ROWELL in the chair.

FISH'S LAMP.

One of the subjects presented during the half hour devoted to miscellaneous business was the heating attachment for kerosene lamps, invented by W. L. Fish, of Newark.

Prof. Seely.—Mr. Chairman, it gives me great pleasure to say that I think this is one of the best things in a small way that we have had for

years, and I think the society will earn some credit to itself by introducing this lamp to the public. It is a little article, but of very wide application. It will certainly be a convenient article in every household, and in many manufacturing operations it will be useful. I think that I shall find it of service in the laboratory. It will be useful, if we may employ the word useful in this application, wherever spirits are dispensed. I think if it was properly presented to the authorities it would be adopted at once in every hospital in the army.

Mr. Tillman.—The evaporation of water by passing a chimney or flue through the vessel is very old, and I suppose that all there is new in this is the adaptation of the principle to lamps.

Mr. Churchill.—It seems to me that unless the cup is set over the top of the chimney, as proposed in some cases by the inventor, a considerable portion of the caloric will be lost.

Fuel in the Arts.

The Chairman having called the regular subject of the evening, "Fuel in the Arts," the discussion of this was renewed.

Dr. Stevens.—There has been no furnace yet constructed that will burn properly all kinds of coal. On the Ohio river it is found that a furnace suitable for burning the bituminous coal of one region is not adapted to that which is found in other localities. An entirely different system is required for burning anthracite, from that which is suited to bituminous coal. Anthracite coal after it is once on fire should never be disturbed. At my house after trying different plans I adopted the system of kindling the fire in the fall and keeping it constantly burning till spring, making no more disturbance of the fire than was necessarily incidental to replenishing with coal and removing the ashes. Bituminous coal, on the other hand, should be frequently stirred.

Mr. Veeder.—I desire to see the inventive talent of the country directed to some plan for burning the heavy rock oils, in their crude state, just as they come from the ground. The refined kerosene oil, such as is burning in this lamp, is worth about forty cents per gallon, but the crude oil has been sold in this market at ten cents per gallon. I believe that if the minds of inventors are directed to the matter we shall have some plan devised for burning the crude oil so perfectly that the great expense of refining will be dispensed with.

Mr. Tillman.—From the minutes, I infer that this society indorsed, at the last meeting, the furnace invented by Mr. Siemens. This furnace merely heats the air for the blast, a very old device. That there is a saving of fuel over other hot blast furnaces amounting to fifty per cent., I do not believe. If you turn carbon into carbonic acid gas you produce all of the heat which the carbon and oxygen will yield. Mr. Siemens first forms carbonic oxyd, and then carries this gas off to another part of the apparatus and there burns it, producing carbonic acid; but he generates no more heat than he would by direct combustion to carbonic acid in the first place. Carrying about his substances through pipes and flues will not get any more heat out of them.

Mr. Fisher.—It seems to me best to get at facts in regard to what has

been done rather than indulge in hopes and speculations of what may be done. Bituminous coal has been burned in locomotives on the Illinois Central railroad, and an analysis of the gases in the fire box showed that the combustion was perfect—there was no carbonic oxyd, nor any hydrocarbons. The same results have been produced in other places. The problem of making a furnace that will burn bituminous coal without smoke is already solved.

Mr. Dibben.—One word before we adjourn, in reply to Mr. Tillman's remarks on Siemens' furnace. I conversed last week with a friend who had charge of one of these furnaces, and he says the economy is as high as stated. The temperature of the escaping gases has been measured by a pyrometer, and it is found that while in ordinary furnaces the products of combustion enter the smoke stack at a temperature of 2,600° to 3,000°, by Siemens' regenerators all but 300° of this heat is taken from them and imparted to the air and gas before they are combined in combustion, thus utilizing 2,300° to 2,700° of heat which are now wasted. The coal is first distilled into combustible gases, and then these gases are heated before they are burned, the air to burn them being also heated. The gases produced by this combustion pass through interstices in two masses of brick work, heating them, and giving up their own heat, so that they enter the stack at the low temperature named. When the brick work becomes heated the hot products of combustion are turned through two other masses of brick work, and the air and gas are drawn through the two which have just been heated. It is by this saving of waste heat that the great economy is effected.

Mr. Tillman.—The double passages for the products of combustion alternately are not new. Siemens' masses of brick work will undoubtedly last well, but it takes up room which cannot be spared except in a few cases. It certainly could not be used in locomotives.

The same subject was adopted for the discussion next week, and the Association adjourned. ENOS STEVENS, *Secretary pro tem*

AMERICAN INSTITUTE POLYTECHNIC ASSOCIATION,
October 16, 1862.

Prof. Joy being absent, on motion of Mr. Fisher, SAMUEL D. TILLMAN, Esq., was called to the chair.

Mr. Fisher read an extract from the London *Times* relative to the performance of steam traction engines in the streets of London, and added some comments upon the feasibility of the kind of locomotion on common roads.

The sewing machine of Madame Demarest, of New York city, was then exhibited and put into practical operation, which gave very general satisfaction to the spectators. The peculiarity of this machine is that the needle is stationary and the cloth is crimped and run upon it. It is, therefore, apparently only intended to sew the lightest kind of cloth. The machine is sold at the moderate sum of five dollars.

Dr. Churchill exhibited and explained the operation of the lamp-forge, in which petroleum and other cheap hydrocarbons are used as fuel, it being designed for light mechanical and chemical work.

The Chairman then introduced to the audience Mr. Hamilton Towle, the American engineer, who had acquired a world-wide reputation for the ingenious contrivance by which he saved the steamship Great Eastern, as had already been described to us at a former meeting by a passenger.

Mr. Towle was received with hearty applause by the audience, and proceeded at once to describe a new invention of his for ascertaining the shape of a ship's bottom while she is afloat. The principle of this machine is similar to that of the conformeter for ascertaining the horizontal contour of the head. A series of bars are arranged so as to slide endwise, independently of each other, by means of springs; this is placed under the vessel, and upon being set free, the bars move longitudinally until the end of each touches the ship's bottom; at that point they are fastened by catches, and upon being raised out of the water the ends of the series of bars are found to describe a curve corresponding precisely with the shape of the ship's bottom on the line where the bars were applied. The steamship Great Eastern being then in Flushing bay with a hole in her bottom, caused by running upon a rock, Mr. Towle took the occasion to say that it would be perfectly feasible to ascertain the precise form and extent of the injury done to her, by means of the apparatus just described.

An interesting debate then followed upon the best manner of repairing the great ship.

Prof. Renwick stated that his son was the engineer who had the direction of the repairing of the ship; he had examined the plan adopted for building a coffer-dam around a portion of the ship, within which the work of fastening on new iron plates was to be done, and he had no doubt that it would be successful.

The regular subject for discussion, "Heat and its Economical Applications in the Arts," was then taken up.

Mr. Fisher opened the debate, and in the course of his remarks took occasion to inquire whether it was feasible to use fuel in a liquid rather than a solid form. The cheapness of petroleum was such that it might yet come in competition with some kinds of coal. This kind of fuel could be stowed between the skins of an iron ship like the Great Eastern, thus leaving more room for freight. This space in the Great Eastern is, I think, two feet wide; and as it extends all around the vessel, it would hold an enormous quantity of oil. There would be some economy of labor in using this fuel, as, instead of being transported about the deck, as coal is, it could be drawn by a pump through small pipes. In regard to heating the air which supports combustion, there seems to be a difference of opinion among authorities. In Siemens' furnace, the air and the gaseous fuel are both heated to some 1,300° before they are burned, and it is claimed that the heat is increased to the same extent. But Mr. Charles Wye Williams says that there is no advantage in heating the air before it enters the furnace. We know that when the air began to be heated some 600° for iron furnaces, the process of making iron was accelerated. It was found that one bushel of coal used to heat the blast, did more good than several

bushels on the grate. I have made no experiments myself, but it would seem as if there should be more intense heat in the combustion if the air was first heated. There is a difference of opinion, however, among authorities.

The Chairman suggested that the volatile hydrocarbons passing off from crude petroleum and mixing with the air would produce an explosive compound. This liquid fuel would be dangerous, not easily handled, and always higher in price than coal.

Mr. M. P. Coons then presented and explained his gas generator; with the cheap hydrocarbons, he maintained that gas could be used economically as fuel; the economy being in only burning the fuel while it was doing useful work.

It was the opinion of several members that when only a little fuel was required, for instance, in making a drawing of tea, that it would be economical to burn gas; but for the general purpose of cooking and warming, nothing would be found more cheap and cleanly than the American anthracite coal.

Mr. Charles A. Seely.—I have for the past two years been experimenting upon the feasibility of obtaining intense heat by burning compressed gases, or burning fuel in compressed air.

The quantity of heat depends upon the amount of oxygen consumed, and the intensity depends upon the amount consumed in a given space. If we burn hydrogen gas in pure oxygen under the pressure of the atmosphere, we obtain heat sufficiently intense to melt platinum, but by compressing the gases into half the space we ought to have heat twice as intense.

It is perfectly practicable to apply an additional pressure of fifteen pounds to the inch, or one atmosphere, even in an ordinary furnace, and by proper arrangements it may be carried to fifty atmospheres. This would give us a new power to work with. We may perhaps volatilize all substances, including platinum; and if carbon can be melted, and diamonds produced, this is the way to do it. I see that within a few months three or four persons in England claim to have invented or originated the plan of obtaining a high heat by burning with compressed air, and I wish to revive the recollections of the Association to my discussions of the subject.

I proposed the subject of fuel, Mr. Chairman, as I stated at the time, with the view of obtaining information in relation to the various new modes of burning petroleum, and I have been much edified by the remarks which have been called forth.

I will add my share to the information elicited, by explaining an apparatus which I have devised and tried. It consists of a cup to contain oil, with a number of tubes passing vertically through the bottom, and open at both ends. The spaces between the tubes are filled with wicking, and of the various substances which I have tried for this purpose, I prefer sand. The oil is conducted by capillary attraction to the surface of the sand, where it is lighted, and the air draws up through the tubes to maintain the combustion throughout the whole body of the flame. It is in effect a combination of argand burners. If used without a chimney, a blast is required. I was led to this plan by searches for some mode of burning petroleum in the air engine, and in my opinion this will be found the best plan for that purpose.

Mr. Fisher.—Have the gases ever been heated for the oxyhydrogen blowpipe?

Prof. Seely.—Not that I am aware of. I do not think much of the hot blast, however; the expansion of the air tends to diminish the intensity of the heat, counteracting to a considerable extent the effect of heating the air.

The Chairman.—I see in the room our old friend, Mr. Everett. He is now located at Cleveland, Ohio, as a manufacturing chemist, and has made a great many experiments on coal oil. He can probably give us some interesting information on the subject.

Mr. Everett.—Coal oil is not now manufactured. Petroleum is so cheap that the manufacture of coal oil does not pay. We call the petroleum "coal oil" from habit, but it is a misnomer. I have nothing of interest to say in regard to either substance.

Mr. H. J. Callo.—I came over from Jersey City, and have sat all the evening hoping to hear something about fuel, but I have been disappointed. I am a chemist, but at present am engaged in distilling at Jersey City. I have adopted some improvements in burning fuel, by which I save twenty-five per cent. of the cost. This saving is effected by burning a cheaper material. I burn the fine coal dust. The only difficulty is in getting a man to feed the fire properly. The dust must be thrown in very frequently, and spread evenly over the grate. I formerly paid $12,000 a year for coal, but now it costs me $9,000. Yet I have to turn round and pay a man three or four dollars a week more, in order to get one who can fire with this fine dust.

Mr. Overton.—I will remark in this connection, Mr. Chairman, that my fan is just the thing for blowing a fire with fine coal. Unlike other rotary fans, it has a piston which will work against pressure. I believe that all you can do in generating heat from carbon is to burn it completely—combine with each atom of carbon two atoms of oxygen. And I will further remark that I believe the time will come when a far more intense heat will be used for generating steam, with a small extent of boiler surface. You have probably seen the accounts of the locomotive that was altered in Jersey City. The pipes were reduced in length one-half, and the boiler made more steam.

Mr. Dibben.—Was not the length of the fire box increased to the same extent as that of the pipes was diminished?

Mr. Overton.—I do not know how that was.

Mr. Dibben.—It was.

Mr. Fisher.—Several years ago a Mr. Bennett had an engine here in which the air was compressed, and I should like to know if there is any one present who is acquainted with the results of that experiment. The fire box was inclosed and the air was forced into it by an air-pump; a safety vavle opened when the pressure reached a fixed limit, and allowed the products of combustion to escape into the boiler. The engine was placed in a steamboat, and very good speed was obtained from a moderate sized engine. But the valves were cut out by the ashes, and the plan was abandoned.

Mr. Churchill.—I have found that the best plan for burning gas as fuel, is to surround the jet with a series of concentric chimneys. A slight

draft is created through the annular spaces, and as the flame is spread out by the vessel above, over these spaces, the air comes in contact with it and completes the combustion. There is no smoke.

"Paper and its Manufacture" was selected as the subject for the next week, and the Association adjourned.

C. W. SMITH, *Secretary pro tem.*

AMERICAN INSTITUTE POLYTECHNIC ASSOCIATION,
October 23, 1862.

The Chairman, Mr. SAMUEL D. TILLMAN, presiding.

IMPROVED COAL OIL LAMP.

Dr. Coburn, of Newark, presented several improvements in lamps. One improvement exhibited was a modification in the mode of interposing some slow conductor of heat between the burner and the collar of the lamp to prevent the heat from being conveyed into the oil. The speaker stated that the Hard Rubber company had purchased several patents for different modifications of this plan, but he thought his was better than any of the others, for the reason especially that in his the screw is formed of metal, while in others it is formed directly on the rubber, and as the rubber is softened by the oil, the screw is very quickly destroyed.

Dr. Coburn also exhibited an excellent device for attaching a concave mirror to a lamp, so as to turn on a horizontal axis, designed for reading and sewing.

Mr. J. H. Churchill, and others, remarked on the milky appearance induced in coal oils under certain circumstances. He had observed it particularly in heating oil by jets of steam thrown into it, and believed it to be due generally to the presence of water with heat.

INSTRUMENTS FOR TESTING THE EXPLOSIVENESS OF ROCK OILS.

Mr. J. H. Churchill exhibited and explained Mr. G. Tagliabue's apparatus for testing the volatility of coal oil. A lamp heated a dish of oil, and a thermometer, carefully and peculiarly mounted, showed the temperature induced. The great novelty was in the means of igniting and shielding from currents of air the combustible vapor when the temperature is so high as to generate it.

Mr. John Tagliabue described an invention of his own, about to be introduced, which has a constant flame above it, with provision for a perfect non-conduction of heat, and with provision, by waste holes, for securing a uniform level of the water in which the oil to be tested is immersed. The effect of the whole he claimed, when properly managed, by withdrawing the heating lamp after a short period, so as to allow the final heating to proceed very slowly, is to secure much more uniform results than any other.

We test any oil in this particular by holding a lighted taper over it, then

gradually heating the oil, and when the vapor explodes observing the temperature of the oil by a thermometer. In order to heat the oil uniformly, we set the cup which contains it in a water bath, and we must take care not to heat it from other sources. If the flame by which the vapor is to be exploded communicates by means of metal with the oil, the oil will be heated by this flame. I therefore interpose two pieces of clay, to prevent the heat from being conducted from the flame to the oil. In order to heat the oil evenly in all parts, I keep the surface of the oil exactly at the same level as the surface of the water in the bath. Then I keep the flame always at the same height above the surface of the oil, for I find that a variation of the sixteenth of an inch in this height will make a difference of several degrees in the result. I insert a thermometer in the oil; and my instrument is nearly the same as this, excepting that I dispense with the cover and closed chamber above, and my lighting flame is stationary, while in this a taper is applied from time to time as the temperature rises. I should like the gentleman to point out why my instrument will not give as reliable tests as this.

Mr. Churchill.—I have examined all of these instruments with great labor and care, and I am satisfied that it is necessary to cover the oil cup, and catch the vapors in a close chamber. If the cup is not covered, the least current of air blows the vapors away. It is surprising how little movement of air will entirely destroy the operation of the instrument; and unless the vapor is confined in actual contact with the flame, it frequently will not ignite. In the burner, which has a number of radiating jets, I have tried the experiment of extinguishing one jet, and I have seen the gas continue to issue between the two adjacent flames for forty seconds before it took fire. I have also repeatedly seen the gas burst out from the side of a flame, and blow off without burning for some time. It seems to be the property of these vapors to mingle with the air with great reluctance. I have no doubt that the difficulty of burning petroleum without a chimney is principally owing to the fact that some portion of the vapor escapes unconsumed, and thus carries its disagreeable odor into the room. From this property of the vapors, I think the close chamber indispensable. I believe there are also fatal objections to the fixed taper. It aids in heating the oil in some portions of the cup, and may thus raise explosive vapors at temperatures which will not be indicated by the thermometer.

Mr. Stetson.—Through what range of temperature have you found the rock oils in the market to form the explosive vapors?

Mr. Churchill.—From 90° to 134° Fah.

Mr. Guiseppe Tagliabue.—I have no disposition to find fault with my nephew's instrument, but I think the cover and close chamber are necessary. There are 500 barrels of petroleum now in the market, which cannot be sold in consequence of the oil forming explosive vapors at too low a temperature.

Mr. G. Tagliabue, in answer to a question, stated that the results with his instrument are reliable within $1\frac{1}{2}$ to 2° Fah. He thought $1\frac{1}{2}$° to be the range of the errors of the instrument.

An Improvement in Making Electrotype Plates.

Mr. Silas P. Knight.—It is well known that when wax or gutta percha molds, coated with plumbago, are placed in or connected with a battery, and a deposit of copper or other metal made upon the surface of the mold, the action is at first slow and confined to particular parts of the surface; in some cases several hours being requisite to produce a uniform and unbroken metallic covering throughout its whole extent. The process invented by me will cause the deposit to be uniformly diffused over the whole surface of the mold at the instant of its immersion in the battery solution, thus saving several hours' time and insuring a deposit of uniform thickness.

The mold or matrix is made in the usual manner, and coated with plumbago; it is then placed upon a table, with the face upward; a saturated solution of blue vitriol or sulphate of copper is sprinkled upon it, moistening the entire surface; upon this I scatter from a fine sieve cast iron filings, the finest dust being most suitable for this purpose. The dust being sifted upon the mold, is then distributed as uniformly as possible over its surface by means of a flat camel's hair brush, which is passed rapidly and with a light touch over the coating of plumbago. During this process, the solution of sulphate of copper is decomposed, and metallic copper is deposited in a thin film over the whole surface of the mold. This brushing or distribution of the fine particles of iron does not require more than five minutes for an area of five feet; at the end of which time the mold is found to be coated with a thin film of copper over its whole surface as above stated. The mold is now cleansed by allowing water to flow over it, thus removing the solution and the remains of the iron dust; it may then be placed in the battery and the connection made, when it will be found that the deposit commences on all parts of the surface at the same instant, thus insuring a uniform thickness of the metal, and diminishing to a great extent the time required for exposure of the mold to the action of the battery.

All Harper & Brothers' plates for their weekly newspaper, monthly magazine, &c., &c., are electrotyped by this process.

I have received letters patent for the above process.

The Chairman.—This formula indicates the changes, $Cu. S. O._4 + Fe. = Cu. + Fe. S. O_4$. The sulphuric acid leaves the copper and combines with the iron.

Mr. Goodman.—You ought to put one of the O's with the copper and with the iron.

The Chairman.—Yes, I know, by the old theory. But this is the empirical formula, and it is a great deal simpler than the rational formula. You see that the elements are all the same.

New Lactometer.

Prof. Seely.—I hold in my hand a lactometer which I have designed and tested. The nourishing parts of milk are the butter and the cheese or casein; and as the proportion of these two to each other is pretty constant, if we measure the quantity of butter, we ascertain the value of the milk. As the petroleum oils dissolve all fats, I have designed this instrument for

dissolving the butter out of the milk by means of benzole, and measuring the reduction in the volume. It consists you see of two glass bulbs, connected by a hollow cylindrical stem. I fill the lower bulb and the stem with milk, letting the milk rise in the stem to the zero mark. I then pour a quantity of benzole into the upper bulb, when, by inverting the instrument, the milk and the benzole are mingled together. I shake the mixture so as to bring all portions of the butter into contact with the benzole, and then re-invert the instrument. The benzole, being of less specific gravity than the milk, rises to the surface, carrying with it the dissolved butter; and the extent to which the surface of the milk descends in the cylindrical neck indicates the quantity of butter extracted. As good milk contains about four per cent. of butter, if I find that but two per cent. is taken out, I conclude that the milk has been watered one-half. I have tried some milk in this instrument from the same sample of some that I recently analyzed, and I find that its indications correspond very closely with the results of my analysis.

Mr. Smith.—There is one difficulty with this lactometer and with all others. Pure milk as it is drawn from the cow varies so much in quality that ascertaining the quality, by whatever means, is no test of the purity.

Mr. Fisher.—As it is the quality which interests us, and not the purity, this would seem to be no objection to a good lactometer.

Paper and its Manufacture.

Mr. Smith.—I introduced this subject, with a view not of imparting information, but of obtaining it. I will, however, make a few remarks to open the subject. Paper is made of vegetable fiber, and it seems that almost any vegetable fiber answers the purpose. The first step, and one that costs a good portion of the labor, is to get the fibers separated. To effect this the material is ground in mills and macerated in water, reducing it to a fine pulp. It is then formed in sheets by different processes, two of which are principally employed in this country. One of these is the Fourdrinier, which was invented in France and perfected in London. In this an endless web of wire cloth is run through the vat of pulp, picking up the pulp and carrying it off in a sheet, which is pressed between rollers, and then dried. The other is called the cylinder process. In this the pulp is formed on a perforated hollow cylinder from which the air is exhausted, so that the pressure of air upon the outside against the perforated cylinder holds the sheet of pulp upon the surface.

The Secretary explained the essential condition in the preparation of the material to preserve the fibrous condition of the matter. Grinding it to dust ruins it, and even reducing its fibrous condition beyond a certain degree, gives it an undesirable character. He remarked on the fact that matter seems in paper-making to conform to a law not found in general manufactures, *i. e.*, that while a moderate subdivision will not change the character of rags, a fine division will cause the particles to cement themselves together, without the addition of any substance, into a hard material called paper, essentially different in its character from rags. He said "half stuff," or paper stuff, partly beaten, was soft and rag-like, but the same pulp beaten in pieces or just sufficiently beaten to be proper "stuff," would,

if allowed to dry in a considerable mass, ring when dropped upon the table.

Dr. Stevens.—In these days, when everything is made of paper, from our money to our shoes, there can be no more interesting subject than this. It used to be said "There is nothing like leather," but now there is nothing like paper. The paper manufacture has arrived at a degree of perfection which surpasses that of any other manufacture. The rags are thrown into a mill and torn to pieces, they are macerated in water, bleached and formed into paper, all cut into sheets of any desired size, each sheet trimmed upon its four edges, and the whole process occupies but one day. The rags may be sent from this city on one day and the paper received on the next. All of the trimmings are thrown again into the vat, so that there is no waste. Neither is there any waste of heat. The steam that drives the engine is enticed back into the building, led through the rollers for drying the pulp, and conducted through tortuous channels, performing a multitude of offices, till all of its heat is extracted from it, when it is allowed to escape into the chimney. This may all be seen in the State of New Jersey, within twelve miles of this city, by any one who is not a paper maker; paper makers are not allowed to enter the works.

Mr. Fisher.—I think, Mr. Chairman, that our paper dealers are behind our paper makers. I have had occasion to want paper in rolls, and I could not find it in market. I think if our dealers would keep it in this form, they would find considerable demand for it. It would be useful for many purposes.

The Chairman.—We have heard a good deal about using wood for making paper; can any one tell why it has never succeeded?

Mr. Stetson.—It costs too much to prepare the fiber.

Mr. Dibben.—That is exactly the answer. If we had some process of separating the fibers cheap enough, we could make good paper from bass wood. Besides the processes, Mr. Chairman, described here this evening, there is a process in use in a great many places in this country, in a great many more in Europe, and in millions in China, which is called the hand process. The pulp is spread upon a fine wire sieve, and the sieve is turned over upon a piece of felt. A second piece of felt is laid upon this and then another layer of pulp is deposited upon it. In this way a pile of alternate layers of felt and pulp is formed, and it is then placed under a press and the water is pressed out of it. It is then spread upon grass and dried in the sun. When first laid upon the felt, the layers of pulp are half as thick as my finger, but under the press they are brought down to the desired thickness of board. I had a lot of board made in this way—I wanted it stronger than common.

In the cylinder process the fibers are drawn partly parallel, and consequently the board is not as strong as when the fibers cross in all directions.

Better paper is made in this way than by machinery, and at not greatly increased expense.

The same subject was continued.

Thomas D. Stetson, *Secretary.*

American Institute Polytechnic Association,
October 30, 1862.

Dr. R. P. Stevens in the chair.

Cast Iron Forts.

Mr J. Wyatt Reid.—Mr. Chairman, I have here some models of cast iron blocks which I have designed for the walls of forts. You see that the surface is cast with alternate depressions and projections, so that the blocks lock into each other; thus binding the whole wall together in such manner that, if one block is broken out, the wall will not fall down. Indeed, 100 feet of the wall may be undermined without bringing it down. Projectiles are now made of such weight, and propelled with such velocity, that, as we have repeatedly seen, granite walls are soon drilled and crumbled to pieces, and, unless some better material is brought into use, the use of land fortifications will have to be abandoned. It has been proposed to face the walls of forts with wrought iron, but we all know that as wrought iron rusts on the surface, a scale of the oxyd falls off, exposing another portion of the metal to the action of the air, and thus the sheet is rapidly worn away; while the scale of rust on cast iron adheres and forms a protecting coat which preserves the remainder of the mass from rust. These blocks may be built up in front of the walls of our present forts, and they may be made of whatever thickness is found necessary to resist the shot in use, and then if more powerful missiles should be introduced, the walls may be increased in thickness by raising an additional layer of blocks. Cast iron will resist a crushing pressure of 100,000 pounds to the inch, granite about 11,000, and brick, 4,000 or 5,000.

Mr. J. K. Fisher, alluding to the question raised, as to the velocity of shot, agreed to the proposition disputed by some, but now pretty well established, that the force of a moving mass for destructive effect, is as the weight multiplied by the square of the velocity. He said the Horsefall gun, in Great Britain, fired thirteen inch shot through the target representing the plating of the Warrior. Some iron acts very differently from others. At Shoeburyness, in England, recently, one shot half buried itself in one target without cracking the iron.

The Secretary.—The range of rifled projectiles is greater than that of round balls, but the initial velocity is not as great. The greater range with a lower initial velocity is due to the greater momentum in proportion to the resistance of the air, owing to the elongated form of the projectile.

Mr. Fisher.—If these blocks are cast of several tons weight each, as proposed, the difficulty of breaking them will be very great. I recollect seeing the efforts in progress at the Novelty Works to break a mass of cast iron, which by some oversight or accident became chilled in the furnace. After trying several more rapid plans, such as dropping weights upon the mass from a great height, some very slow process was resorted to—I do not know what.

The Secretary.—It was drilled in lines and split to pieces with chisels.

Mr. Fisher.—It was a mass of about thirty tons, but it did not look very large—some six feet in diameter, I should think.

The Secretary.—Five feet.

Mr. Fisher.—Rather more than five feet, I should judge.

The Secretary.—I measured it.

Mr. Fisher.—A weight of 200 pounds was allowed to fall upon the mass a great number of times without producing any effect except making a dent. The height from which the weight fell, I should think, was some fifty feet.

Mr. Reid.—Sixty feet.

Mr. Jas. Cregan, a machinist from the Novelty Works, presented, through the Secretary, a novel construction of callipers for measuring mechanical work. Mr. C. had introduced it with success as a more accurate instrument than the ordinary ones.

Mr. Henry J. Callo, of Jersey City, read a statement of the testimony relating to the explosion of a locomotive at the Long dock this week. The strength was estimated equal to 240 pounds per square inch. There was reason to suppose that the pressure was very high, but no means existed for ascertaining exactly the pressure.

Mr. Tagliabue made an exhibition of his apparatus for testing the explosive character of coal oil.

Mr. Brace said the instrument was likely to be a very useful one. Oil which may be heated to 120° or higher before flashing is safe, below that point is considered dangerous. I manufactured coal oil before the rock oils came into use, and on the discovery of petroleum, I removed my operations to the valley of the Kanawha. An old well had been sunk in that valley twenty years ago for salt, and a spring of oil was struck and thousands of barrels ran to waste. After the present excitement in relation to petroleum commenced, that old well was cleaned out, but the oil had ceased to flow. On the other hand, eighteen years ago, in boring for salt, a reservoir of gas was struck, when the drill and rods, weighing 2,400 pounds, were thrown out like a ramrod from a gun, and that gas has been blowing ever since. A gasometer has been erected and the gas is used for boiling the salt. The salt water and gas both come from the same hole, and 800 barrels of salt are made per day; the gas being sufficient to boil half of this amount.

Mr. Page.—No fire has ever been occasioned in the country by refined petroleum. We have had fires from crude petroleum, but we shall not have these any more. The fires have been occasioned by the light oils, and now the oil is exposed at the wells in shallow tanks until these light oils are evaporated. I recently had an order for 500 barrels of light petroleum oils, and I was unable to fill the order in this city. This instrument of Mr. G. Tagliabue was got up at the request of the heavy oil dealers to test the presence of volatile oils, and we are satisfied that it accomplishes the purpose. When the common council of Brooklyn had the matter under consideration of preparing an ordinance to obviate the great risk of keeping these oils, I proposed to the committee to prohibit the importation into the city of any oils under a specific gravity, but a few experiments showed that this was no indication of comparative safety; for a very heavy oil may have a small quantity of very volatile oil mingled with it, and its specific gravity will be high, and yet the volatile oil will evaporate at temperatures so low as to make the oil dangerous. The question is, at what

temperature are the dangerous vapors given off? and that is shown by this instrument.

The Secretary inquired if the proportion in which the vapor was mingled with the atmosphere, was not important; it was generally believed that hydrocarbons were explosive in all proportions between one in three and one in fifteen. Now, do these instruments provide properly against variations in the quantum of air allowed to find access in the warm oil and mingle with the vapor?

Mr. Page and Mr. Brace thought the instrument would always detect within reasonable limits the dangerous character of an oil.

Mr. H. J. Callo.—As all of these oils give off vapors below their boiling points, only more slowly, will not these vapors accumulate when oils are stored in close cellars or rooms, and thus may we not have explosions from oils which will not appear to be dangerous when tested by this pyrometer?

Mr. Churchill.—That is really the objection, in a scientific point of view, to this instrument. Still, from experiments that I have made, I think the instrument will show very well the *comparative* safety of oils.

The whole evening was spent in the discussion of these absorbing topics, and the regular subject, "Paper and its Uses" was not reached. This subject was accordingly appointed for the next meeting, which is to be held a fortnight hence, and the Association adjourned.

THOMAS D. STETSON, *Secretary.*

AMERICAN INSTITUTE POLYTECHNIC ASSOCIATION,
November 13, 1862.

The Chairman, S. D. TILLMAN, Esq., presiding.

DOOR LOCKS AND EXPLOSIONS.

Mr. Churchill.—This is one of Pye's patent door locks; I have had one a year; it has been subjected to pretty rough usage and is a good lock still. It cost a dollar, and the inventor says that it cannot be picked.

Mr. Wm. H. Butler.—It is a good cheap lock, but claiming that it cannot be picked is offering us a little too much—an unpickable lock for one dollar. All locks of this character when placed upon a door may be opened without picking. It is necessary only to introduce a thin screw-driver or blade between the edge of the door and the jamb and press the bolt back. That can be done by any sneak thief, who has not the skill to be ranked among burglars. I believe that burglars do not recognize those boyish and unskillful thieves as belonging to their fraternity.

Mr. Stetson.—I would ask Mr. Butler if the statement on the card is correct? It says this lock cannot be picked.

Mr. Butler.—I should say that it would take one of Mr. Chubb's apprentices about fifteen minutes to pick this lock if he had it on the bench before him, but if he was obliged to operate through a door it might be difficult.

Mr. Rowell.—The idea has frequently occurred to me—why should we

place a lock on the door? Why not secure it in the wall of the building and let the bolt catch into the door? Then we might have the lock as massive as we please.

Mr. Butler.—In Egypt they place the locks on the outside of the doors. The locks are made of wood, and travelers speak of seeing men with bundles of wooden keys on their shoulders.

Mr. Fisher.—Would it not be a good measure of security to have the keys so massive that they could not be carried without being seen?

Mr. Butler.—That would involve the necessity for a large keyhole, by which powder could be introduced and the lock blown off. This is now the principal danger that we have to guard against. The permutation lock is capable of several hundred millions of changes and cannot be picked, but it may be blown off by gunpowder. To prevent this, bank locks are now made with vents or openings for the gas to escape, and this is generally a safeguard against the effects of powder, but I suppose it might not be against gun cotton, as that explodes more quickly than gunpowder.

The Secretary called on Mr. Butler to exhibit and explain in this connection the key of the lock manufactured by him for street doors, which was done.

The key is about as large, both in thickness and area, as a quarter of a dollar, and works in a slot in the metal plate in the front of the door, only about one-sixteenth inch thick. This is for street doors and common doors of any kind. Bank directors are now most partial to what are called combination locks, which have no key-hole and will of course admit no powder. They are operated by adjusting disks or the like on the face of the lock.

Gun cotton, or fulminates, which act quicker than gunpowder, it was thought would be more destructive in a lock, but Mr. B was not aware that they had been actually used by burglars, though he believed there was always danger that they would be.

Mr. Dibben exhibited a model of Mr. John Tremper's automatic cut-off mechanism for steam engines. Its great feature is its quickness of action. The valve is a ring, and drops into another ring so as to cut off the steam without slamming upon any seat, and needs no dash put to soften the blow, like most of such drop cut-offs.

The Chairman.—Will Prof. Seely state whether gun cotton explodes more quickly than gunpowder?

Prof. Seely.—Mr. Chairman, I shall make my remarks with considerable confidence, as I have probably made more gun cotton than any other person in America, and have tried more experiments upon it. If a bunch of gun cotton, pulled out loosely, is laid upon a hot stove, and some gunpowder is laid by the side of it, probably three-quarters of the persons in the room would say that the gun cotton explodes the more quickly. If some gun cotton is pulled out loosely, and some powder is sprinkled on it and a match is applied to it, the cotton will burn without setting the powder on fire. This is owing to the fact of its burning with a flame in which the heat is not intense. If some gun cotton is placed loosely in a wide-mouthed vial, and is lighted at the top, it will burn pretty quickly at the top, but the combustion will proceed more and more slowly till about three-fourths of the mass is burned, when it will go out. If gun cotton is twisted

into a hard string, it will burn but little faster than ordinary cotton. In loading a cannon with it, if it is put in loosely, it will explode like gunpowder, but if it is rammed down hard, with a tight-fitting wad on the top of it, it will not explode at all—it will not burn any more than dirt. Several accidental explosions of gun cotton that have occurred within my knowledge, prove that although the force is great, it is generated slowly. At the place which I now occupy, 244 Canal street, a very careless operator was drying ten pounds of gun cotton over a hot furnace, when it exploded. The man was standing in the same room and within a few feet of the furnace; his hair was singed, but he was not otherwise injured, while the windows of the front room, some forty feet distant, were blown out. Mr. Janes, who was three stories above, said that he did not hear much noise, but he felt himself lifted about eighteen inches. Last winter a building was blown up in Fifty-first street, and I examined the premises very carefully the next morning. It was said that there was 300 pounds of gun cotton in the building, and the destruction was certainly not as great as would be produced by 300 pounds of gunpowder. The roof was lifted and the walls were thrown down, but the materials were not thrown any considerable distance. In July last Mr. Dornbach was killed in Williamsburgh by an explosion of gun cotton. He was filling a barrel intended to hold sixty pounds, and had got it nearly filled when it went off. His hands and face were burned, but he was not injured otherwise than by the burning.

Mr. Butler.—How was the cotton fired?

Prof. Seely.—Gun cotton explodes by percussion, and it was either percussion or friction which set that on fire. The cotton had become very warm in the bright July sun, and then the violence used in driving it into the barrel with a stick set it off, by either percussion or friction. If it had been sixty pounds of gunpowder it would have blown Mr. Dornbach to pieces. This is the article which was made by Schonbein, the discoverer, and is known as "gun cotton." It differs from ordinary cotton in containing more oxygen, but it does not contain enough to burn it. It has been discovered since that by varying the manipulation a little, a larger quantity of oxygen may be introduced. Gunpowder contains sufficient oxygen to effect its complete combustion; it will burn in a close chamber or under water, but this is not the case with gun cotton; it will not burn unless supplied with oxygen. By adding chlorate of potash or niter, the oxygen is supplied and a compound is produced which explodes with great violence, and it is possible that in this way a practical substitute for gunpowder may be produced.

Mr. Stetson.—It may be well, as we are on the subject, to consider the difference in the different kinds of explosive compounds. When fulminating mercury is fired it shatters everything in its immediate neighborhood, but it does not seem to follow up the fragments and send them to a distance; while the force of gunpowder is less violent in its close vicinity, but follows the fragments further, and consequently throws them to a greater distance.

Gun cotton may be burned up cleaner and make a greater expansion than gunpowder, under proper conditions.

Dry Gas Meters.

Mr. John Johnson.—The dry meter on the table I placed there for the inspection of members. In connection with the subject I will state that the first dry meter in America was made at the suggestion of Wm. S. Johnson by James Bogardus in 1832, and there has been on the average a patent a year granted since.

Paper and its Uses.

Mr. Fisher.—I would ask if any one present has any definite information in relation to the manufacture of paper from the husks of Indian corn? Many years ago there was a good deal said on the subject, but recently it has been revived as something new. In 1852 a book was published by the Smithsonian Institute, which contained varieties of paper made from some thirty different materials, and I believe one has been published in England which contained paper from over a hundred materials.

Mr. Chambers.—I have seen in the possession of the Austrian Consul-General, in this city, some beautiful specimens of paper made from the leaves of the maize, by a process discovered by Mr. Alois Auer, director of the imperial printing establishment in Vienna, Austria.

The Chairman.—I have here a communication to the society from a correspondent in Ohio, accompanying a sample of grape leaves.

"Mount Carmel, Ohio.

"I observe in the discussions, on the 23d October, of the Polytechnic Association, the subject of the manufacture of paper and materials for the same was introduced. Having for a long time remarked the fine fibrous character of the grape leaf after being touched by frost, I came to the conclusion that it would be an excellent article for the manufacture of paper, for when crushed in the hand it adheres together almost like cotton, which is not the case with any other kind of dry leaf with which I am acquainted. The Labrusca or Fox family of grape all possess the peculiarity of wooliness mentioned above. The color might be an objection, but if it could not be bleached it would still answer for colored paper, and I think that large quantities could be procured, as there are hundreds of acres annually added to those already in cultivation. I inclose you a few leaves by which you can judge of its appropriateness. Hoping it may prove of some benefit, I remain yours, &c., T. V. Peticolas."

Mr. Fisher.—I should think the fiber was too weak.

The Chairman.—Here is another communication on the subject of American jute; will the Secretary please to read it?

Mr. Fisher.—I should think it was hardly worth while to read it; I see it is very long.

The Chairman.—If the reading is objected to, it must be omitted.

The Secretary.—The communication is interesting, and, with the consent of the society, I will briefly state its substance. The writer points out that the plant known as American jute is not allied botanically to the Indian jute, and he then shows that it may be cultivated in this country, probably with profit as a material for paper making.

Prof. Seely.—I recently had occasion to examine some very old books,

and was impressed with the difference between the paper of which they were made and the paper that is manufactured at the present day. In tearing that old paper a very rough edge was formed by the long fibers of the material; but if a piece of modern paper is torn, the edge formed is very smooth, showing a very short fiber. This is owing to the use of the material so many times. It is collected and worked over and over until the fibers are broken into short pieces. These broken fibers will not answer for filtering paper, for paper made of them, if placed in water, would be converted into pulp. The filtering paper used in chemical analyses is all made in Sweden. It is retailed in this market at twelve cents a sheet. Photographic paper was, at one time, all made in England; then in France; but now Saxony makes the best, and principally supplies the markets of the world. It must be made of perfectly uniform materials. If some competent American manufacturer would embark in the business, he might monopolize the market in this country, and would probably find a large export demand.

Mr. Stetson.—Can any one tell what was the result of Mr. Lyman's experiments?

Prof. Seely.—I understand that he is very sanguine of success. He places straw in superheated water; that is, water under pressure, and he claims that the silex is all dissolved.

Mr. Rowell.—In regard to Mr. Lyman's first process—that of blowing the material from a steam gun—I had a long talk with a large paper manufacturer who has kept close watch of the experiments, and he said that the only difficulty was the expense. They could not separate the fibers cheaply enough. They had strong hopes that rattan might be worked by the process so as to pay, and were making arrangements to test the matter thoroughly by erecting an establishment on the edge of a canebrake at the South, when the rebellion broke out and the enterprise was of course abandoned. The advantage of canes is that the cylinder could be nearly filled with them, and thus but little steam would be wasted.

Mr. Churchill exhibited samples of French paper, and explained the method of sizing in an English manufactory. About sixteen pounds of alum was used with 100 pounds of skins, prepared at a temperature of 160 to 180 degrees Fahrenheit.

Dr. Minthorne stated that a friend of his had used kelp with success for paper.

The Secretary said that immense quantities of kelp could be obtained at a low rate, and thought if it was useful for paper the Association would very greatly forward the art by bringing out the fact.

Dr. Minthorne said his friend worked by hand in a small way. He made good paper, but there was objectionable material in the kelp. It abounded in sizing matter.

Mr. Stetson.—I have seen seaweed thrown in upon the shore, and lying in a pile several miles in length, and at least two feet in depth. The difficulty is in keeping it from one interval to another of its coming to shore.

Mr. Fisher.—Why cannot flax be prepared by Lyman's steam gun process?

Mr. Rowell.—Every kind of vegetable fiber was tried, but the insurmountable obstacle was the expense.

Mr. Stetson.—Can any one tell us exactly what was the "papyrus," and whether it has been used in modern times?

Dr. Stevens.—The papyrus was a lily which grew in the Nile. Attempts have been made to cultivate it in England, but without success.

The subject of "Iron-plated Ships" was selected for the next week, and the Association adjourned.

THOMAS D. STETSON, *Secretary.*

AMERICAN INSTITUTE POLYTECHNIC ASSOCIATION, *November* 20, 1862.

PYE'S LOCK.

Mr. Parsons.—Mr. Chairman, at the last meeting Pye's lock was before the Association, but the owner, Mr. McWilliams, was not present. He is now here, and I think that he ought to be allowed to make some explanation.

Mr. McWilliams.—Mr. Chairman, I have been told that it was asserted here at the last meeting that my lock could be picked in fifteen minutes. Now, I make this proposition: I will put one hundred or one thousand dollars into a box if any other man will put in an equal amount; I will fasten it with one of my locks, such as I sell for twelve dollars a dozen, and if the man can open the box he shall have the money that is in it; if he cannot open it I shall carry the box home with the money in it.

Mr. Stetson.—I should like to know if the lock is to be one that is offered in market for a dollar; for if it is, I will put in the money and will bring an expert here who will open the box. It should be understood that one of the material points in burglar-proof locks is secrecy in regard to their construction. For five hundred or six hundred dollars a man may make a lock which is entirely different from any other, and he may keep the mode of its construction secret; but locks that can be sold for a dollar must be duplicated, and if a man undertakes to pick one, his first step is to go into market and buy a similar article and study its construction.

Mr. McWilliams.—Very appropriate remarks when applied to unchangeable locks, but not applicable to this. Our claim is for the double-bitted key, which throws the tumblers both ways from the bolt. We put in the key and turn the tumblers, and then run the saw through for the bolt to slide; thus fitting each lock to its key. We have no two locks alike. I made the calculation for one style of our locks, and found that it was capable of 42,000,000 of changes. I claim not only that the lock cannot be picked, but also that it cannot be got out of order; and I extend the proposition that if the man who puts his money with mine, either one hundred or one thousand dollars, is able in a reasonable time either to pick the lock or to get it out of order, he shall have the money.

The Chairman.—Our object is to understand the principle of mechanism presented here, and all bets in regard to any man's articles are out of place.

Mr. Stetson.—That is true, Mr. Chairman; still, in the preliminary half hour, I suppose there would be no impropriety in making the test, and if

the gentleman will bring his box here at the next meeting, I will have a man here who will open it before us all. It will be rather interesting.

Shaw's Sash Lock.

Mr. Allen.—This is a model of Shaw's sash supporter and lock. A pinion is secured in the window frame and works in a rack secured to the edge of the sash. The pinion is provided with a small catch to hold it from turning; the catch having a thumb piece for pressing it from its hold whenever it is desired to raise or lower the window. For a heavy sash a coiled spring is attached to the pinion, to counteract the weight of the sash. The arrangement is a great deal cheaper, more compact, and less likely to get out of order than the ordinary arrangement of cords and weights. It will save 175 per cent.

Mr. Adriance.—There is inaccuracy in the language in talking about a saving of 175 per cent. If a man saves 100 per cent. he saves the whole and of course can save no more. If the old style of window cost one dollar and this can be made for 25 cents, then this will effect a saving of 75 per cent. But if we wish to say how much more the old window costs than this, then we say it cost 300 per cent. more. In one case the per centage is reckoned on the dollar, in the other on the quarter.

Photographic Printing Machine.

Mr. Fontaine.—This is a machine for printing photograph positives from the negative. It looks, you see, something like a small wooden trunk. The negative is secured in the upper part of the lid, directly below an opening through which the light enters, the light passing through the negative as usual, and forming a reversed copy or positive upon the sensitive paper below. The sensitive paper is wound on this shaft and is turned under the opening by a crank. The negative is secured by a spring at one edge, and is pressed down in contact with the positive paper for a moment while the paper is stationary, and at the same instant the orifice for the light is opened by the hole in the revolving plate above it coming over the orifice. It will print four pictures a second, which is at the rate of 14,400 per hour. These sheets were printed with the machine, and I will pass them around for inspection. By condensing the light by a lens, 30,000 pictures per hour may be printed.

The Chairman.—I see Prof. Seely present; will he please to give us his opinion of this machine?

Prof. Seely.—I admire the mechanical ingenuity displayed in the construction of the machine. The process employed is that which Talbott employed in 1840. It has been repeatedly tried, but is not now used to any extent.

Mr. Fisher.—How much time is occupied in changing the sheets?

Mr. Fontaine.—With one assistant (my daughter, who is 18 years old) I can print and finish 350 positives per hour.

Mr. Stevens.—Could this process be used for illustrating a book? I ask this question in reference to a work now in manuscript of an acquaintance, who is delaying its publication on account of the illustrations. The work is on physiognomy. Heretofore works on this subject have been illustrated

by portraits of different individuals, but the author of this wishes to illustrate all of the passions by a single countenance; showing its expression when in an amiable mood, again when distorted by anger, again in the pomposity of the military strut, and so on. What would be the price of pictures by the quantity if printed on this machine?

Mr. Fontaine.—They can be printed for two cents apiece. I sell them mounted on cards at four dollars per hundred.

Mr. Fisher.—Can you print them on rolls of paper, or is there a limit to the size?

Mr. Fontaine.—By having a slit across the box, instead of a circular opening, the printing might be done on a roll by continuous motion. I have a photograph made by this process that is $5\frac{1}{2} \times 7$ feet.

The Chairman.—There would be no difficulty in making a large machine and driving it by a steam engine?

Mr. Fontaine.—There would not.

Gedney's Pistol.

Major Taylor.—The novelty of this pistol is in the priming; the fulminate is formed in small cylinders about the thirty-second of an inch in diameter and an inch in length, and a small piece is cut off and carried under the hammer just before the hammer strikes the cone. The great advantage is the perfect safety of the weapon from accidental discharge. If it is dropped or struck by any hard substance there is no cap on the cone to discharge it. The priming is water-proof, and is not injured in fording streams or by becoming wet in any way.

Prof. Seely.—What varnish is used?

Major Taylor.—Gum shellac; but the priming is water-proof independently of the varnish.

Mr. F. Dibben asked if it was not possible to make the primer ignite while in its reservoir in the gun, and what would be the result if it occurred?

Major Taylor thought it could not occur; it never had in the practice yet.

Mr. Dibben was familiar with the material, and said it could not be made twice alike. He thought it might be improved and made successful, but he thought the explosions produced here in this exhibition would not be accepted by the United States authorities as sufficiently strong and reliable.

Mr. J. A. Talpeys exhibited and explained his sawing machine, operating a circular saw, for carpenters or others' use, by the action of the hand. It feeds itself automatically, and conforms to all conditions required, so that a man working alone may first put in the stuff properly and then turn the crank.

Recent Discoveries of Silver and Gold Veins in Mariposa.

Mr. Chambers.—Mr. Chairman, I have here a communication from our member, Mr. Bruce, who is now in California. He used to take a great deal of interest in the American Institute, and in the Polytechnic Association, and it seems that he has not forgotten us. One portion of his letter is of public interest, and I will read it:

"At present there is a great excitement in Mariposa, from the recent discovery of very valuable silver and gold veins, which thus far surpass in richness any heretofore found. Large quantities of the ore have been sent to San Francisco for assay. The silver has turned out at the rate of $500 per ton; the gold much beyond that figure; and, as they dig down, the richer it becomes. Speculators from San Francisco are here in squads, buying up the various interests. The discoverer is entitled to 500 feet of front, running back as far as the vein extends; all other claimants are entitled to 250 feet, and as it requires a large outlay of money to construct mills and machinery, none but great capitalists can profit much by this discovery, except by selling their interests to the best advantage to others, and in this way large fortunes are being made. My sons have some valuable claims."

The regular subject, "Iron-plated Ships," was then taken up.

Mr. Fisher.—As I proposed this question, I suppose it devolves on me to open the discussion with the remarks that I have to make. It has been found, in England, that solid plates are better than armor made of several thin plates. If the plate is solid and the iron is good, the force is expended in altering the form of the shot, but if the plate is weak, that gives way, and the form of the shot is not changed. It has been found that wrought iron shot is not as good as cast iron, and it is now proposed to make the shot of steel. The main office of these plates is to keep out shells, as solid shot are not very destructive. Mr. Whitworth has sent a shell through a target like the side of the Warrior; the shell passing through the plate and bursting in the target, tearing it to pieces. The novel thing about this shell was, that no arrangement was prepared for exploding the charge; it was fired by the concussion of the projectile as it struck. It could accordingly be handled with perfect safety, as dropping it, even into the hold of a vessel, would not cause it to explode.

Mr. Dibben.—What, then, caused it to explode when it struck?

Mr. Bartlett.—This is one of the manifestations of the conservation of force. The heat is generated by the destruction of motion. The mechanical force or motion is converted into caloric.

Mr. Dibben.—These target experiments are calculated to mislead, from the fact that the conditions under which they are made are very rarely realized in practice. The gun is placed in a position exactly at right angles with the target, the distance is short and is accurately known, and consequently the penetration or destruction is much greater than it would be in actual warfare. I think the plates yet have the advantage of the guns. No practically successful wrought iron guns as large as 100-pounders have ever been made in any considerable numbers, and the best gun yet manufactured is the Parrott, or some one made on the same plan—that is, a cast iron core with bands of wrought iron. Mr. Parrott has made a large number of 200-pounder rifled cannon, and three which fire his shot weighing 300 pounds, and the proof of all of these guns has been eminently successful; the charge for the 100-pounders is one-tenth the weight of the shot, but that for the 300-pounders is a little less than one-tenth. So confident are Mr. Parrott and his men in the strength of these guns,

that in trying the first proof they stand in the immediate vicinity of the gun when it is fired.

The subject of "Recent Improvements in Warfare" was chosen for the next meeting, and the Association adjourned.

THOMAS D. STETSON, *Secretary.*

AMERICAN INSTITUTE POLYTECHNIC ASSOCIATION,
December 11, 1862.

The Chairman, S. D. TILLMAN, Esq., presiding.

A communication was read from the secretary of the board of managers, in relation to articles entered for premiums.

On motion, the time for receiving articles for premiums was extended to the 18th December next.

LAMP FOR BURNING OIL WITHOUT A CHIMNEY.

Prof. Seely read the following communication from Mr. B. Woodard, of Buffalo, New York, dated December 1, 1862:

I notice that at the meeting of the Polytechnic Association, on 23d October last, you had under consideration a lamp for burning oil. In experimenting with petroleum, I have hit upon a device for burning rock oil, either refined or crude, equally well, without a chimney and without smoke or smell, except when extinguished, and for a few moments after. Take a common single tubed night lamp used for fluid, and prick three holes through the cap into the body of the lamp; make the holes near enough to the tube to come inside of a petticoat, which can be made of tin, and soldered air tight to the cap, and come up flush with the top of the wick (a trifle above the wick tube). Have the petticoat large enough to leave just double the space or bore there is to the wick tube, and it will burn petroleum or other oil, camphene fluid, or other combustible fluids equally well, and is non-explosive.

It is a simple contrivance, but if you think it worthy of your attention, I would like to have it brought before the Association for their consideration.

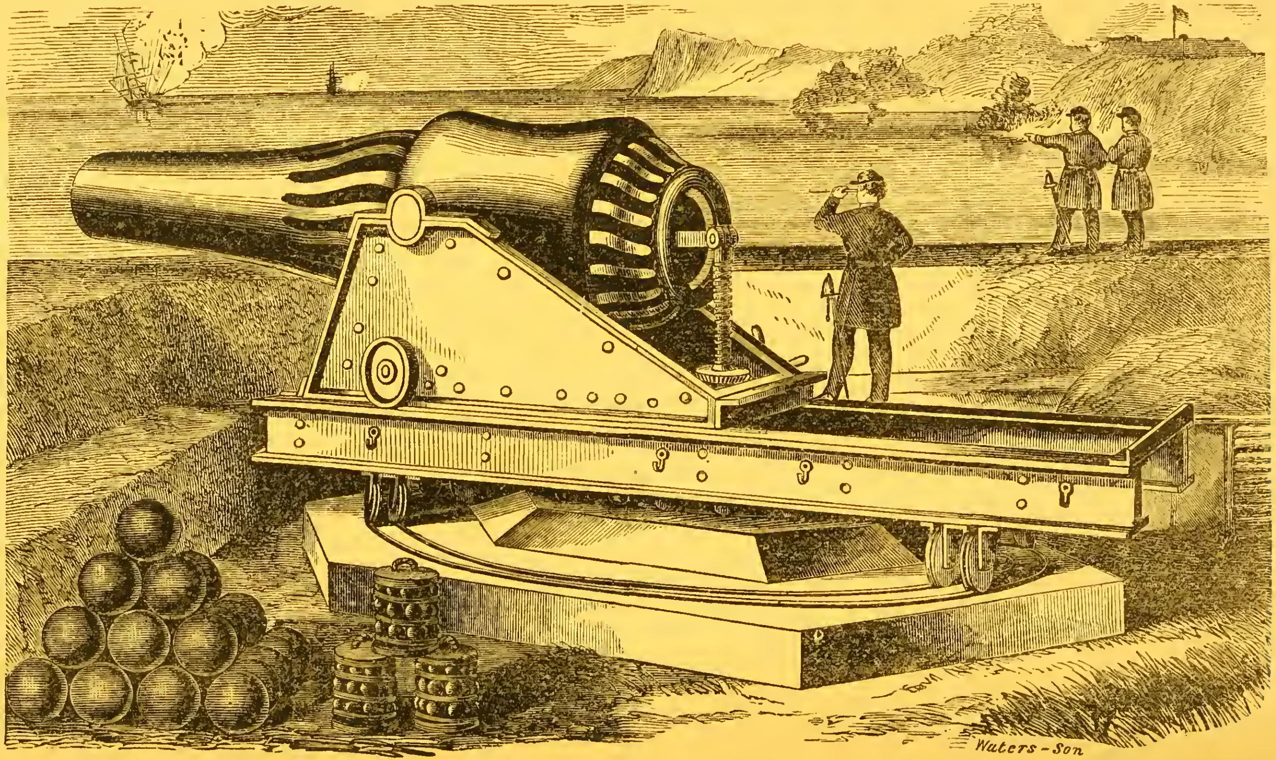
P. S. I should have added, there is to be no vent to the lamp, other than through the three holes between the petticoat and wick tube. The experiments may be made more interesting by enlarging the lamp, tubes, wick, &c., and make the petticoat of transparent glass. The accumulation of smoke, gases, &c., can then be seen confined within the petticoat, and also its combustion.

A saving of 2 per cent. is effected, and the lamp always clean.

PLAN FOR ENLARGING LOCKS ON CANALS.

Mr. Bull introduced Major Taylor, who proceeded to explain and illustrate, by model, his plan for enlarging locks of canals by a new construction of the gate.

A drop gate, much outside of the present gate, is to be employed on the



WIARD'S 20 INCH GUN, MOUNTED ON HIS IRON PIVOT CARRIAGE.

Weight of Gun, 55 Tons; of Shot, 1000 lbs.

upper side, and a peculiar swing gate, swinging opposite to the usual direction, is employed much outside of the usual one on the lower side. The total addition to the length is some 50 per cent., and gained at a small cost. The present practical length, *i. e.*, the length of boat passed, is but 97 feet with the present locks; the length to be passed with the new gates at both ends is intended to be 150 feet and some inches.

The cost of fitting one lock with these devices would be, as estimated, about 2,500 dollars. The cost of enlarging a lock to an equal extent, by masonry, would be about ten times that amount.

The regular subject of the evening, "Modern Improvements in Warfare," being called by the Chairman,

The Secretary introduced to the meeting Mr. Norman Wiard, widely known as a successful inventor, experimenter, discoverer and manufacturer of ordnance, and as the author of a series of improvements which had been submitted to the attention of the government, and which he was now prepared to place before this Association. Mr. Wiard was distinguished for presenting or elaborating in drawing to the minutest details his various inventions, while many are satisfied with presenting their schemes in general and crude outline. This difference in method in every light is very obvious, and it both enables and entitles Mr. Wiard's statements and suggestions to receive careful consideration.

Great Guns.

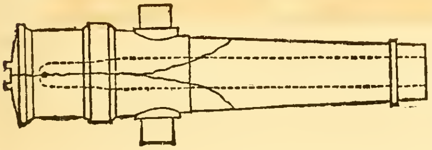
Mr. Norman Wiard.—It is a matter of public concern, that although much time, money and ingenuity have been expended in efforts to produce safe and effective ordnance of large calibers, no large gun has ever been designed or made that could be pronounced entirely trustworthy, even after it had been subjected to the usual test of firing, a process exposing the gun to destruction and imperiling the lives of the gunners and inspectors; for after enduring any prescribed number of trial charges, there is no certainty that the gun will not burst at the next round. Numerous examples could be quoted to show that large guns have burst with a small charge after having withstood a succession of heavy charges.

Cast iron guns, with a tensile strength of 16,000 lbs. to the square inch, have exhibited greater endurance than others of the same size and model having a tensile strength of 38,000 lbs.

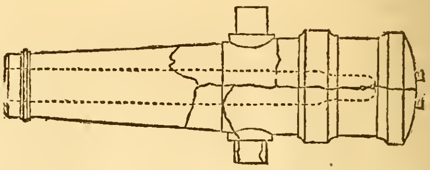
Experts have found themselves unable to account for the fact that a large steel gun, with a tensile strength of 120,000 lbs. to the square inch, exhibited less endurance than a cast iron gun with a tensile strength of but 30,000 lbs., or that the strongest metal does not make the strongest gun.

By examining the fragments of guns of ordinary forms which have been burst, it will be observed that they burst in three ways:

First. They split through the cascabel and re-enforce longitudinally to a point forward of the trunnions, and from thence the fracture diverges to either side, leaving the chase and muzzle unbroken. Sometimes cross fractures through



the re-enforce occur, and these are the usual directions of fractures, whether the gun be made of steel or wrought or cast iron, and whether cast solid or hollow. It is the same, also, even if an initial strain is placed upon a cast iron gun, as in the Parrott, Blakely, or Treadwell plan.



Second. The muzzle drops off. It is usual to attribute this form of fracture to the premature bursting of shells in the gun.

Third. Guns burst from flaws or defects in construction. In this case the direction of the fracture is governed by the direction of the weakness.

To account for the bursting of guns, excessive measures of pressure have been attributed to gunpowder. Writers on the subject seem to have overlooked the fact that a certain quantity of gas must be evolved from the combustion of a certain quantity of powder, and that a uniform measure of pressure must be exerted upon every square inch of surface of the chamber in which it is fired if it is in a closed space, whether the quantity be small or great, provided the powder fills the space before firing. Yet Hutton, Robbins, Count Rumford, Treadwell and Rodman, have each made estimates varying from 15,000 to 750,000 lbs. to the square inch. If we estimate a cubic foot of powder to weigh 60 lbs., the result of combustion of gases and residuum will weigh 60 lbs. The gases being $\frac{57}{100}$ of the whole by weight, when expanded to the pressure of the atmosphere, will occupy about 417 cubic feet of space. To return 417 cubic feet of gas to $\frac{57}{100}$ of a cubic foot of space, according to Marryatt's Law, would give an expansive force of about 11,145 lbs. upon the square inch, with a temperature of nearly 6,000° Fah.; and this pressure can never be exceeded or even attained in a gun, as there must of necessity be considerable escape of gas by windage, vent and loss of expansive force from the absorption of the heat that is communicated to the surrounding metal of the gun and projectile. This low estimate of pressure is positively confirmed by the following facts:

In Major Wade's book entitled "Experiments on Metals for Cannon," we find that after a six-pounder cast iron gun had endured a number of charges of six pounds of powder and sixteen balls without injury, it was submitted to pressure by water and burst with less than 20,000 lbs. to the square inch. Other experiments are recorded where guns burst with 8,000 lbs. of water pressure after having endured excessive powder proof. Major Wade reports, and Col. Hagner confirms his statement, that Springfield musket barrels are permanently enlarged in their strongest part by a water pressure of 5,000 lbs. to the square inch—an effect never attained by the powder proof.

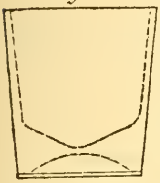
Again, when the Great Eastern was launched, Brahma presses were used, of ten inch caliber, and ten inch thickness of wall, made of the very best quality of cast iron; this being the proportion of caliber to wall in most ten inch guns, and such guns have endured double shotted charges without bursting. Yet these Brahma presses were invariably burst whenever they were submitted to a water pressure of 5,000 lbs. to the square inch. It is not the pressure of the powder alone that bursts guns.

HOW GUNS BURST.

When gunpowder is fired from a gun, two prominent phenomena are to be observed; namely, the wonderful expansive force which ejects the shot, and the heat which results from the combustion of the powder.

Let us exhibit the effect of heat on metals by a familiar experiment.

Fig 1.



Pour boiling water into a glass tumbler; the heat, communicating more quickly to the thin sides than to the thick bottom, breaks the glass from unequal expansion. If we wish the tumbler to withstand the sudden communication of heat, we must make it everywhere thin alike, so that the heat may pass through it uniformly and quickly. Hot water may then be poured into it with impunity. But if we wish it to withstand a pressure of cold fluid, it will be necessary to make the walls equally thick; it will then withstand a considerable pressure on its interior surface, even if communicated suddenly. But if, after having prepared it to withstand the pressure, we wish to communicate a pressure accompanied by heat, as of a considerable height of column of melted metal, although the thickness of the walls would be sufficient to withstand the pressure, the heat communicated to the inner surface of the wall would expand it within the outer metal, before the heat reaches the outside, and it would be broken by this unequal communication of the heat. Now, this unequal communication of heat has a similar effect upon large guns. This may, also, be illustrated by a glass model of a gun, which, although strong enough to withstand a pressure on the inner surface of 400 lbs. to the inch, would be broken by the insertion of a heated rod of iron of smaller diameter than the bore, even though so inserted as not to come in contact with its sides, and not accompanied by any pressure against the surface. Three models might thus be broken quickly, in succession, by the insertion of an iron rod heated to a high temperature, while the fourth would break slowly, or not at all, the rod being reduced in temperature, from the heat lost by communication to the broken models. If, however, after waiting a time *for the model to be slowly heated throughout its whole mass*, the outer surface of the gun be touched by the wetted finger, the evaporation of the moisture will make the heat sufficiently unequal, and the model will break. This example may exhibit the direct cause of the bursting of the 100-pounder Parrott gun, on the steamer Naugatuck, on the James river, before Fort Darling, when other guns of the same kind on the steamer Galena, though fired with great rapidity, and oftener, did not burst; all of which may be accounted for by the fact that it was raining at the time, and that the gun of the Naugatuck being on the upper deck and exposed to the rain, was subjected to a more unequal heating than the guns of the Galena, which were between decks.

Fig 2.

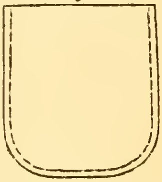


Fig. 3.

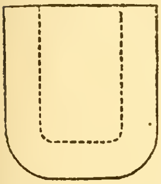
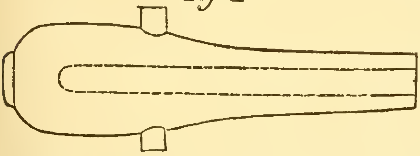


Fig 4



I have stated that guns are more *likely to burst* when fired on *cold* or *rainy* days, and offer the following examples in corroboration: first, two large steel guns, of my fabrication, burst under such circumstances, then this example of the gun on the Naugatuck, and two guns referred to in the appended table, are among many other similar cases I have noticed.

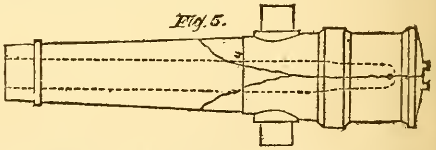
Meteorological Observations, and number of rounds fired each day. A table from Rodman's book, showing that guns burst on cold and rainy days. Diagrams of fractures of guns No. 335 *and* 983 *can be seen on pages* 69 *and* 70, *Rodman's book.*

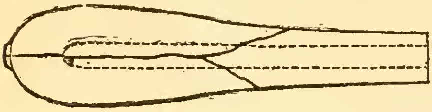
Days of the month.	Mean temperature.	WEATHER.	NO. OF CHARGES FIRED EACH DAY.		
			334.	335.	983.
Oct. 22....	42.33°	Cloudy; fog at 7 A. M..........	Proof 2d.	Proof 2d.	Proof 2d.
27....	43.33	Cloudy; atmosphere hazy	12	12	12
28....	42.33	Cloudy; atmosphere hazy	14	14	14
29....	43	Cloudy; atmosphere hazy	20	20	20
30....	42	Cloudy; atmosphere hazy	20	20	20
31....	43.33	Fair........................	20	20	20
Nov. 2....	48.66	Fair........................	20	20	20
3....	42.66	Fair; atmosphere hazy..........	25	25	25
4....	42.66	Showery	25	25	25
5....	52.66	*Showery*	32	32	11
7....	66	Fair........................	20	20	Gun Burst.
11....	37	Cloudy; shower at 4 P. M.........	31	31	
12....	43	Cleared up at 11 A. M............	31	31	
13....	42.33	Occasional sprinkle of snow.......	32	32	
14....	34.33	Occasional sprinkle of snow	32	32	
16....	39.66	Rain and sleet..................	32	32	
17....	40.33	*Cold rain*.....................	33	31	
18....	42.33	Occasional sprinkling of rain......	56	Gun	
19....	35	Rain and snow..................	8		
25....	17.66	Fair........................	64	Burst.	

There being two forces acting upon guns which burst one the direct pressure of the gases evolved from the powder, and the other resulting from the expansion by heat of the inner metal of the gun, both forces acting in the same direction, and nearly at the same time, it would seem difficult to show one to be pre-eminently the cause of the fracture.

The fractures of large guns upon improved models, with a light chase and heavy re-enforce, that have burst with the service charges, are curiously alike in their direction, running through the center of the breech and re-enforce, to a point usually forward of the trunnions, and branching off at either side, generally breaking the gun into three pieces. This direction of fracture holds whether the gun has the outlines of the army columbiad, of the Dahlgren gun, or of the Parrott gun with its strong wrought iron re-enforce, and whether the gun be made of steel or of cast iron. It would scarcely be expected, when the Dahlgren guns burst, with this great thickness of

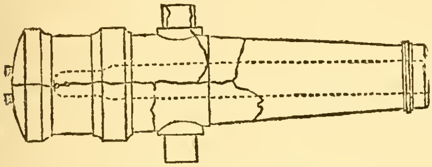
Fig. 5.





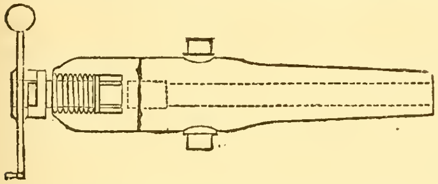
metal about the breech, that the fracture would occur through the cascabel, where the metal has more than twice the thickness exhibited in the army columbiad, but this principal direction is usually the result.

Guns sometimes exhibit additional fractures to those represented above, and this occurs when the thickness of metal is continued further forward



towards the muzzle, having the same effect as if a tire, or strong band, were placed upon the gun at the place where the fracture usually branches off to either side, thus delaying the longtitudinal fracture until the expansion lengthwise of the inner metal is greater than the *elasticity* and *ductility* of the re-enforce, when the cross fracture occurs. It may be said then, in brief, that the fractures at right angles to the plane of the bore are caused by the lengthening of the inner metal about the bore by heat, while the outer metal remains the same length, or with less expansion of length, until ruptured, and that longitudinal fractures are due *principally* to the enlargement of the inner metal *by heat* in the direction of the diameter, or *radially.*

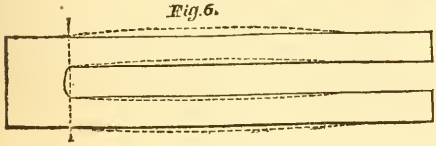
If the gun be parallel all the way to the muzzle, the cross fractures will occur more frequently along the re-enforce, because in that part it is exposed to the highest temperature, and, consequently, the greatest expansion of length. I have seen a diagram of an Armstrong gun with only one



fracture. In this gun a die is pressed with a powerful screw against the inner metal of the gun, and against the bottom of the bore. A heavy weight on the crank is used, by repeated blows, to press forward the die by the screw with considerable force. The screw and die were made of steel with little compressibility, and the lengthwise expansion of the inner metal of the gun would increase the tension upon the re-enforce, *already great from the pressure of the screw,* to bursting. Greater thickness of metal, at either end of the re-enforce, would make the cross fracture more frequent. It is a corroboration of this theory that the guns of the Dahlgren model, with more than double the thickness of metal behind the chamber, though made of the strongest material, should break in the same direction, forward of the trunnions, but sometimes exhibit only cross fractures (when made of cast iron) at the rear of the trunnions. It is evident that the model is best in which the direction of the fracture is least uniform, but a properly constructed gun should not burst at all.

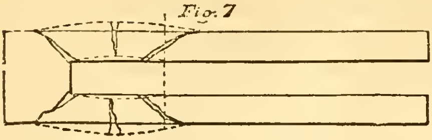
Guns, however, are usually broken through the breech—their strongest part—and beyond the range of the pressure, which is, of course, limited to the bottom of the bore or chamber. The diagram in Capt. Rodman's book, p. 43, exhibiting the various kinds of strain to which a gun is subjected at each discharge, considers the gun as if made up of staves, and really exhibits only the

Fig. 6.



strain from the expansive force or direct pressure of the powder, bending the staves outward; and page 47 of the same book, by diagram, the direction of fracture due to such strain, not through the breech, but running at an angle to the plane of the bore.

Fig. 7



To show that it is improbable that the direct pressure of the powder should be the cause of fracture, as exhibited by the gun actually broken by firing, prepare three plates of metal, say four inches thick, twelve inches wide, and sixty inches long, with plane surfaces; the middle one on being heated to 1,600° will be found expanded one-sixtieth part of its length, or will be sixty-one inches long. On placing it between the other two, a part of its heat is immediately communicated to their contiguous surfaces only. The expansion of one surface of the outside plates, while the other surfaces remain cold, warps the latter to the form of a segment of a circle. Now, supposing them placed upon the diagram of a burst gun, the center metal of which has been heated by the combustion of powder, it is evident that the fracture in the particular direction exhibited must have resulted from the unequal expansion of the gun by heat, and a diagram exhibiting these curves, the result of this expansion, will be exactly the opposite of the curves on the diagram by Rodman, and will account for the breaking of the gun through the breech, beyond the range of the pressure made by the powder.

Fig. 9.

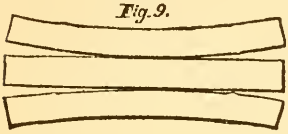


Fig. 10.

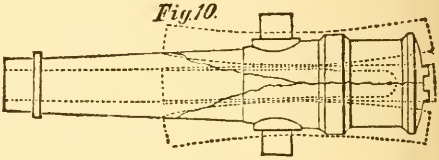
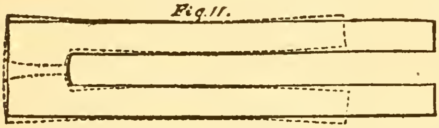
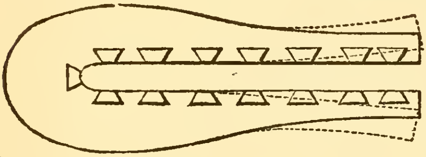
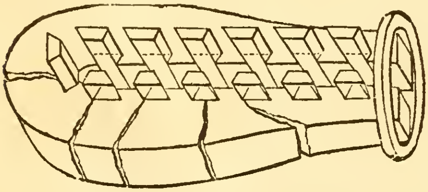


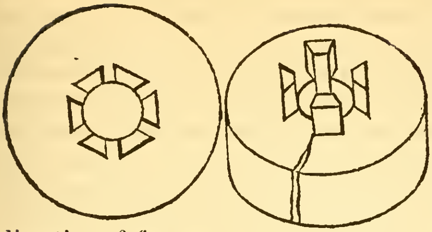
Fig. 11.



The following diagrams exhibit the effects of expansion of the inner metal by wedges. The drawing exhibits a section of the metal of a gun, with dovetail notches cut along the surface of the bore. Upon driving wedges into the notches the muzzle would be expanded, as shown by the dotted lines. If a band were put upon the muzzle, the fracture nearest the muzzle, and the one through the cascabel, would be most likely to occur first. If the band were placed over the first mentioned fracture, and the wedges along the re-enforce and at the bottom of the bore driven most, as the heat is most intense at the bottom of the bore, cross fractures of the







re-enforce would be the result, as shown in the diagram. As the heat expands the metal in the direction of the diameter also, its effect in this direction also must be considered. The expansion of length, however, is of most consequence in considering the probable direction of fracture.

That the fracture almost always intesects the vent, has been heretofore referred to the weakness resulting from drilling away part of the metal; but on page 355, Major Wade's Reports on Metals for Guns, we find that after a gun had been put to extreme proof, and exhibited signs of fracture, a hole was drilled one inch forward of the base ring, and four inches from the line of the vent, to a depth of four inches, and of the diameter of one and a quarter inches. The gun was then fired with double charges of power, and with a bore full of balls and wads, eleven times, to bursting. Although the piece burst into more then twelve fragments, one of the fractures intersecting the vent, it did not split through the large hole, showing that the gun had strength to resist the pressure of the powder, but burst, notwithstanding the drilling away of so large a part of the metal, from the communication of heat. The true cause, probably, of the intersection of the vent by the fracture, was the communication of heat to the surface of the vent, thereby expanding the column of metal about it; for it should be recollected that the passage of a large quantity of gases through the vent would communicate more heat to its surface than would be communicated if there was no current, but the capacity of the vent only filled; in that case not much heat would be supplied to the surface, because the quantity contained within the vent would be small.

But in this example, as in all others, as is well known to ordnance inspectors, the fracture began to exhibit itself on the interior surface of the bore.

It is often noticed as a curious phenomenon when large guns burst, that notwithstanding the chase or forward part of the gun, several feet in length, may be thrown many feet end over end, the shot passes through the chase the length of the bore without being diverted from the direction of its aim. This fact corroborates the theory under consideration, as it is evident that the shot is not projected by the same force that bursts the gun—the communication of heat to the inner metal of the gun requiring a longer interval of time, and gun metals being comparatively non-conductors of heat. In Rodman, plate II., fig. 2, is shown the interior line of fracture of a 10-inch columbiad. Here a thin bit of metal, indicated by the line marked ☞, is shown, which seems nearly to envelop the bore. Nearly one-half the re-enforce was broken off this gun in the same manner as

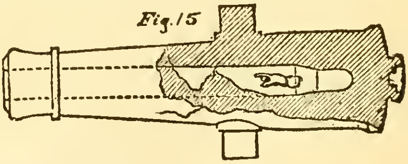


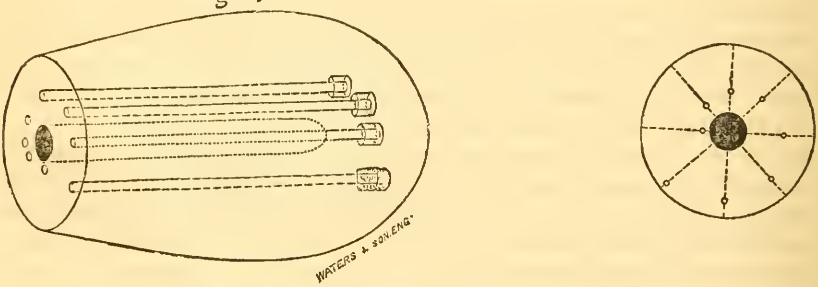
Fig. 15

chips break off a stone door cap when a building is burning, but in this example the outside of the stone is first heated while the inside remains

colder. The outward *pressure* of the powder at the time of this fracture would surely have carried away so thin a piece of metal; but it remains standing *to show that the pressure against the surface had been reduced before the gun broke*—a remarkable evidence of the true cause of the bursting of the gun. The diagram exhibiting the place and quantity of heat shows but little heat at any of the surfaces of the gun. From this, also, we may have been hitherto deceived as to the importance of the study of its effects; and we can only appreciate it by some experiments like the following: A clean rifled musket, the barrel of which weighed about five and a quarter pounds, was fired twelve times with the ordinary charge, at intervals of five minutes between each discharge. The time during which the surface of the musket was radiating away the heat from beginning to end was, therefore, about one hour. At the end of this time its temperature was 200°. The radiation was somewhat hindered by the wood of the stock, which was a non-conductor, partially enveloping the barrel, and the burnished surface of the barrel, which was a non-radiator. The whole amount of powder was less than one ounce, and it communicated this great amount of heat to five and a half pounds of metal. There would be a material difference in the amount of heat communicated in this experiment, if the barrel were not clean inside, as the residuum of powder would be a non-conductor, and would prevent its communication to the metal of the barrel. The temperature of the gases in a large gun, say 100-pounder rifled cannon, would be much greater than in a musket; as the temperature is increased as the resistance to the expansion of the powder is increased. The work of the powder in a gun is to overcome the inertia of the shot, and to do this it presses against a certain number of inches of area. If the shot be short, the pressure is still exerted against the same area. The projectile in a 100-pounder rifle gun is about 12 inches in length, while the projectile from a common rifled musket is less than one inch in length. The resistance from the inertia would be thus about twelve times as great in the large gun as in the small one, and the expansive force or pressure, and consequently the temperature, high in proportion.

The ordinary meters, if used to measure the temperature communicated to the gun, as shown by the preceding argument, will be inefficient, as they cannot be applied at the place supposed to be the seat of the highest temperature. A meter for this purpose can be prepared in the following manner:

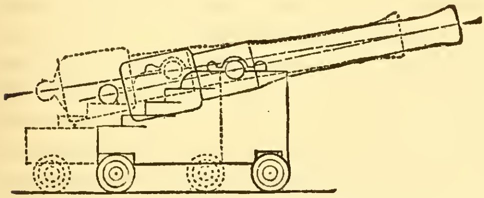
Fig. 17.



Take a gun with eight inches thickness of metal about the bore, cut off the chase at that point of its length where the metal is five inches in thick-

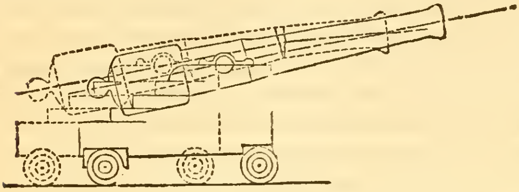
ness, then lay out the face of the muzzle with eight radial lines, equal distances apart, and, beginning upon one, drill a hole parallel with the bore, half an inch in diameter, coming out at the breech and leaving half an inch of metal between the bore and the hole thus drilled ; then drill another hole on the next radial line through lengthwise, one inch from the bore, and so on, each hole being half an inch further from the bore, until the outer one is four inches from the bore. Fit bronze rods into these holes and fasten them at the breech with screws, so that they can have no motion endwise at that end, then file off the ends of the rods flush with the muzzle, when the gun and the rods are at the same starting point of temperature, say sixty degrees, and we shall have a thermometer that will give nearly a correct indication of the quantity of heat communicated to the gun from a calculation based upon the difference of expansion of the metal of the gun and the bronze rods, and a positively correct indication of the place of highest temperature, and consequently greatest expansion, with any number of discharges. To retain a record of the place and quantity of heat at any of the successive discharges, make a number of molds, and fill them with a composition of wax and powdered charcoal with which to take an impression of the face of the muzzle. These molds should be numbered and recorded at each successive discharge. Charges should be made with heavy and light projectiles, and with no projectiles at all, and at long and short intervals between the discharges.

The deductions drawn from these experiments would give us positive knowledge on this part of the subject, and relieve it of the mystery so often referred to by ordnance inspectors; while without the knowledge thus attained, officers of our army and navy seem to be without justification, should they place large guns in our expensive iron-clad ships and fortifications, made without consideration of the important cause of failure herein presented.



When a long rifled cannon is fired at a high elevation, the gun recoils backward on a plane, represented by the deck of a ship, different from the plane of the bore. All bodies in motion resist a change of direction, in the proportion of 1-90th of their whole momentum, or living force, for a change of direction of 1°. If one billiard ball on a table is projected against another at rest, striking it at right angles 90°, the one in motion comes to a state of rest, giving its whole momentum off, to the one before at rest. If the one at rest should be struck at an angle of 45°, the ball in motion would have its direction changed 45° and it would give one-half its momentum to the other. Each would roll the same distance on the table. So, also, if the angle with which they came in contact was one degree, 1-90th of the momentum would be given to the ball at rest. The whole sum of the momentum of a shot projected from a rifled cannon is very great. At the muzzle of the gun, the resistance to a change of direction is sufficient to overcome the preponderance of the gun. If the bore was crooked, the shot would not be much diverted, but the gun would be

moved to conform to the direction of the shot; and many have noticed, when firing guns on ship-carriages, at high elevation, that the breech of the gun was raised, and came down again with a considerable blow on the quoin, or elevating screw. If the chase of the gun is light, the muzzle will

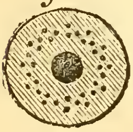


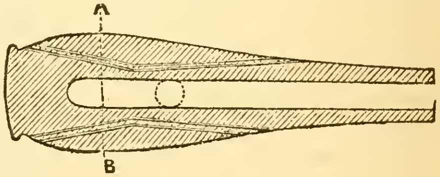
sometimes be broken off, instead of overcoming the inertia of the gun, or lifting the breech suddenly, against the resistance of the preponderance. This example is inserted as one of the peculiarities of living force, as exhibited in gunnery, viz: resistance to changes of direction by bodies in motion, and to account for the failure of many of the Dahlgren and Parrott guns, from the breaking off of their muzzles, as has frequently happened to the Parrott rifle guns, and to the Dahlgren guns since the war began.

From the fact that solid cast guns, of the largest size now in service, have a certain strain upon them within themselves when cast, from the heat leaving the inner metal last, which is relieved by the expansion of the inner metal by the first few discharges, I hold that solid-cast Dahlgren guns, or any columbiads of large sizes, cast solid, may pass the inspection of ten service charges, and be stronger at the tenth discharge than they were at the first—that number of rounds, perhaps, being necessary to relieve them of the beforementioned strain, by communicating the proper proportion of heat to place them in the same state in which we find the hollow cast gun at the first round.

The guns in our service having great thickness of metal about the bore, should not be relied upon in rapid firing, even when exposed to the hottest rays of the sun on their very large exterior surface—the most favorable circumstances under which a gun can be fired—and should never be fired at all, if a hollow cast gun with uniform density throughout the mass, in rain or in cold weather. It may sometimes happen that a hollow cast gun, after the Rodman plan, would exhibit greater endurance than a solid cast gun, made from the same metal and at the same time. At the time of the bursting of two steel 50-pounder navy guns of my fabrication, each at the ninth round, at Staten Island, I suggested to the inspector either that the guns should be fired at longer intervals between the discharges, or that I should be permitted to give elasticity by drilling a series of small holes about the bore, having a certain position relative to each other, and a

Fig 19



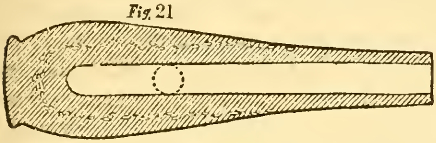


proper direction to permit the expansion of the inner metal without any undue strain upon the re-enforce. Captain Rodman's book, page 297, exhibits the impossibility of casting a solid projectile, cavities being formed in the center of the mass, due to the shrinkage of the inner metal

Fig 20

after the outer shell had frozen, so as to prevent any supply of metal to the center thereafter; and this is related as the cause which led to the hollow mode of casting. These cavities do not occur of necessity in the center of a casting, but of necessity in the center of the mass at equal distances from the cooling surfaces if subjected to an equal rate of cooling; and they are to be found near the center of the mass in the Rodman gun as well as in any other. Their presence cannot be detected at any of the surfaces of the casting. *If they were generally distributed between the inner metal of the gun and the re-enforce, a sufficient elasticity between these parts of the gun might be had, and a similar result arrived at to that obtained by the drilling of the holes*, as shown by diagram. Their presence would account for the occasional endurance of hollow cast guns, but the uncertainty of their uniformity would account for the irregularity of this endurance. The Rodman 15-inch gun, fired at Fortress Monroe, stood the indifferent test to which it was subjected, perhaps, from the occurrence of this uncertain elasticity, and from the fact that it was fired under a hot sun, with slow-burning powder, hollow shot, and windage. Even this questionable success would rarely again be obtained, as the requirements of service are unlikely to permit such favorable circumstances.

Fig. 21



The 15-inch guns have been shown to be inefficient, therefore, for they only give a velocity of 750 feet per second; or they are unreliable (perhaps both), for they will burst as often as the accidental porosity above spoken of is not evenly distributed between the inner metal and the re-enforce. And who can say when these conditions are all fulfilled?

I here leave the subject to be considered by those who have followed me thus far, with the remark, that I have shown that no large gun yet made could be pronounced trustworthy, until it was destroyed. Yet I believe that it is possible to so construct a gun, that not a single trial shot need be fired for the purpose of demonstrating its valuable qualities. That through the light I have thrown on the subject, trustworthy guns can be constructed of any required size, and to give almost any required velocity to shot, less than the unrestrained velocity of the gases along the bore.

When I proposed to show that the heat evolved from the combustion of powder in a gun was the principal agent in bursting, I found ordnance officers opposed the theory, on the ground that but little heat was thus communicated to guns. This was said to me by Major Wade, by Captain Rodman, and indirectly by several others occupying high positions. Major Wade, however, afterwards told me he recollected having seen copper melted by the heat of powder, at a time when a few kegs of powder exploded in a powder-mill. Captain Rodman, in a part of his book before quoted, speaks of "higher temperature exhibited when larger masses of powder are burned in an 11-inch gun, than in a 7-inch," as accounting for three times the force in the larger gun than in the smaller; and Captain Dahlgren, in his report to the Secretary of the Navy for 1862, says "an 11-inch gun was so heated by firing that it was afterward eighteen hours

in cooling." Now I have never claimed that heating a gun would burst it, or that cooling it would burst it; but that heating or cooling one part of a gun to a certain degree, while the remaining part was at a different state of temperature, would burst it, and that the degree of this unequal expansion necessary to burst a gun, must be greater than the elasticity and ductility of its metal. I have also included in my argument the compressibility of the metal; but as compressibility goes before elasticity, and as a gun would be destroyed as effectually if its compressibility were great, by permanent enlargement of the bore, as if it were burst, it is not necessary to include it in a general statement.

HOW TO MAKE GREAT GUNS.

For armored ships, and for revolving forts, guns require to be constructed in a different manner from those heretofore used, or those intended for other purposes. But whenever a gun is produced that will penetrate iron plates, of the greatest practical thickness that can be carried on a ship's hull, the day of iron-clads will have gone by, and fast sailing and manœuvering steamships, armed with guns capable of projecting shot with extremely high velocities, will take their place. Howitzers will always be required for earth-works and fortifications, which makes it desirable that a cheap gun of that class should be provided; one that can be produced with dispatch, and is capable of endurance, even if of large size. Of the great number of practical inventions in ordnance which I have prepared to meet required conditions, I shall herein confine myself to describing three general plans of guns which I have devised, viz: a *spherical compensating* gun, adapted to a turret, so constructed as to be absolutely safe from bursting when fired with full charges of quick-burning powder, mounted so as to be capable of being worked by steam or by manual labor, and so protected as to be entirely safe against penetration by any projectile or part of projectile, the turret having no open port. Second, a gun so constructed as to be absolutely safe from bursting, no matter what charge is fired in it, it having strength to resist the full pressure and temperature of the gases of powder, if confined within its bore, even although the pressure were as great as some of the absurd estimates heretofore noticed; arranged so that much higher velocities can be given to the shot than have heretofore been deemed possible, and which it is practicable to make of any required size and still retain these qualities; and the third a *cast iron gun or howitzer* that can be produced for less cost than the ordinary large cast iron guns, and which I believe is practicable for a caliber of twenty inches.

I should have felt some hesitation, perhaps, in proposing an entire new system of ordnance, for which a variety of guns, turrets, carriages and implements had to be devised, merely as an innovation, but being convinced that radical changes and improvements were imperatively demanded by the requirements of the service, I have so adapted my improvements as to meet all the required conditions. I feel more confidence in my position from the fact that my readers will perceive that conclusions, exactly the opposite to those drawn by the theorists who have heretofore written on the subject, are unavoidable, even from their own examples. I hope my conclusions will not be considered less trustworthy, because I have dis-

carded the terms and symbols of the higer sciences. I have endeavored to explain the subject clearly and intelligibly without their aid, as I know that there is a large class of persons who will prefer to examine the result of my labors in plain terms, not interspersed with algebraic signs.

Guns mounted in turrets, in the ordinary manner, are liable to the serious objection that a part of the port is always open, and projectiles, or parts of projectiles, may enter, especially if an enemy aim to project his shot against the protruding muzzles of the guns, in which case, from their liability to bound and rebound in the limited space inside the turret, they would be fearfully destructive. This error is corrected by the adaptation of a spherical gun to a turret, hereinafter described.

The proper ventilation of a turret is also an important consideration. Sudden and complete changes of the whole atmosphere within a turret, constructed in the ordinary manner, would be required to remove the gases of powder that enter it from the vent of the guns, and the gases liable to flow in through the open space about the guns in the ports. It would be undesirable to draw these gases downward into the ship or fort; and to eject them by a current from below, would involve the passage of impure air to the men occupying the turret to work the guns. In the actual shock of battle, the exercise of the men must be violent, as their number must be limited and their duty severe; hence the importance of superior ventilation. I have succeeded in relieving the subject of all this class of difficulties, by devices for keeping the port and vent closed, in the manner of mounting the guns, and working them by steam or by hand, with the workmen and gunners below, hereinafter described.

I propose first to describe a spherical gun, and a turret to which it is adapted. The gun is designed to possess extraordinary strength, by reason of the great thickness and peculiar arrangement of the different materials of which it is composed, a large proportion of which are of low cost and easy preparation, and to provide, approximately, complete compensation for the unequal expansion of the same by heat.

When it was found necessary to correct errors in time-keeping machinery, clocks, chronometers, etc., due to variations of temperature, compensating devices were provided, designed to take advantage of the different degrees of expansion for certain increments of heat, exhibited by different metals. A gun can be made of such a combination of materials as will resist the pressure or expansive force of the powder, while it provides compensation for the communication of heat to the inner metal, as completely as the pressure of the powder alone has been heretofore provided for. As hereinbefore stated, these considerations not applying to small guns, I shall describe the manner of constructing a very large rifled gun to project a shot weighing one thousand pounds. The gun to be spherical in form, and when completed to have a caliber of fourteen inches, and to weigh fifty-one tons, or about one hundred times the weight of the powder and projectile. It is composed of three metals—Steel, Bronze and Lead. These metals expand, with heat, in about the following proportions:

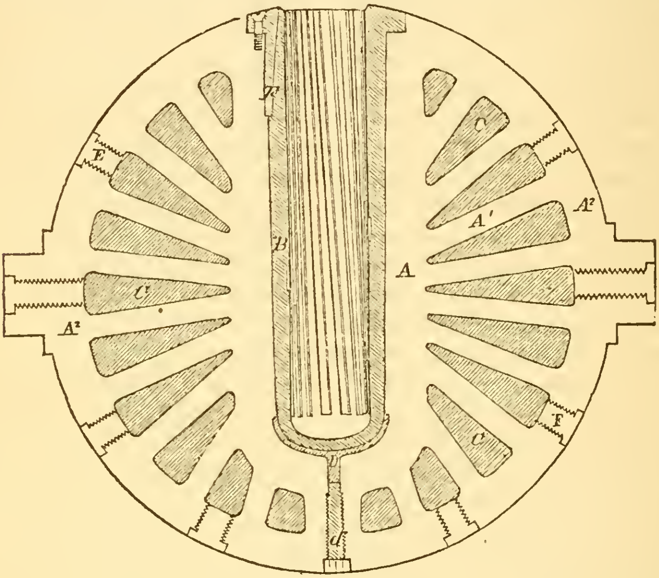
Steel expands........	11
Bronze expands........	19
Lead expands........	28

Their relative conducting powers are:

Lead	180
Steel	360
Bronze	1150

The gun is exhibited in the following section.

The bronze casting A^2 is a hollow sphere, seven feet in diameter, cast upon a core, leaving six inches thickness of metal. A cylindrical center, A, on one axis, has also six inches thickness of metal, and stays, A^1, four inches in diameter, radiate from the center of the external form, connecting the cylindrical center A with the outer shell A^2. Thsee stays, A^1, I term conductors of heat. The outer shell A^2, and the hollow cylinder A, that envelops the steel lining, being of uniform thickness, and



cooled from all surfaces, will be a casting without strain, having been uniformly cooled. The core that forms the chamber between A and A^2 is supported in its proper place by distance cores, through the outer shell A^2, resting upon the outer case of the mold. Through these distance cores E are vents by which the gases and heat from the chamber core escape as the metal flows into the mold in casting.

The first operation after removing the gun from the mold is to remove the sand, of which the chamber-core is composed, through the holes left by the distance-cores, and then to clear out the chamber with acid, in order to remove any sand that may adhere to its surface. After cleaning the metal casting thoroughly, the whole external surface of A^2 is hammered, for the purpose of compressing the metal to its greatest density, and it is designed to affect the density of the metal to about half its thickness. The interior of A, to be afterward lined with steel, is enlarged by pressure obtained by small rollers revolved by a sleeve, with a shaft for its center. The rollers are pressed outward against the surface as they revolve, by wedges, until the whole surface has been passed over many times, thus

enlarging the diameter, by a pressure on small surfaces, until the density of the metal is also affected in this part to half its thickness. The holes left by the distance-cores are then, with the exception of one, stopped by screw plugs *EE*, etc., after which the chamber is filled with melted lead *C*. After the gun has cooled, a hydraulic or other press is attached to each of the holes in succession, and additional lead, in this manner, is forced in, to give the same amount of compression to the inner surface of the chamber as had been given before to the outer surface by hammering, or until the outside shell is slightly expanded. By this means, most of the compressibility of the bronze is taken up, and its elasticity much increased; as, by hammering, a spring temper is imparted to the bronze, giving it the elasticity of spring steel The lead also answers the purpose of a conductor of pressure, from its incompressibility.

The bore of the bronze *A*, to receive the steel lining *B*, is tapered, being about one inch smaller at the breech than at the muzzle. The steel lining is turned a very little larger than the bore, and with a corresponding taper, and is also forced into its place by a hydraulic press. The bronze metal about this steel lining has a strain of compression upon it from the pressure of the lead, and a strain of compression also rests upon the steel lining. Any pressure having a tendency to enlarge the diameter would be resisted directly by the strength of the outer shell, as, when the gun is completed, it is intended that nearly all the compressibility of the bronze shall have been destroyed by the hammering and by the pressure of the lead, as well as a great part of its elasticity, by forcing the steel lining with great force into the tapered bore. The steel lining is to have only a sufficient thickness to retard a part of the heat in the combustion of the powder; so that the proper proportion of heat is communicated to the bronze, and this proportion is regulated by the thickness of the steel lining. A space is left in the bore of the cylinder *A*, and after the insertion of the steel lining *B*, this space is also filled with lead *D*. By this means, careful fitting of the steel *B*, to the bottom of the chamber in *A*, is made unnecessary, and after the lining *B*, is forced in, against the shoulder at the muzzle end, a proper amount of pressure can be equally distributed about the spherical end of the steel lining; and during the service of the gun, this pressure can be corrected by the use of the screw *d*. The steel lining *B*, is prevented from changing its position by any shock to the gun, by two keys *FF*, inserted in such direction as to prevent withdrawal of the lining, without first withdrawing the keys. They also prevent the lining from revolving in the gun, by the pressure of the shot against the side of the lands.

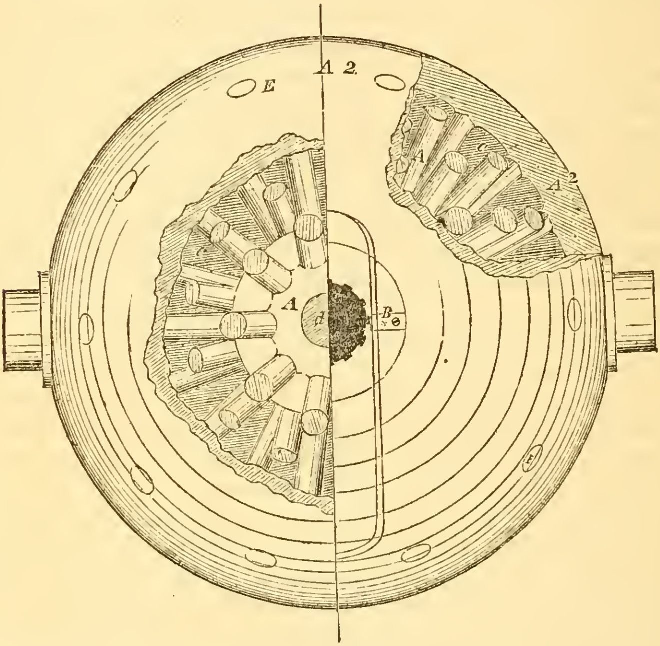
Bronze is one of the best among the conductors of heat, transmitting it with rapidity. The heat conductors A^1 radiate from the center of the sphere, and the bottom of the bore is continued beyond the center of the sphere, so that the mean center of heating surface may be at the center of the gun.

The lead is a conductor of pressure, it being more nearly incompressible than any other of the metals, which renders it eminently fit for this purpose.

The right hand side of the following figure is half of a front elevation; and

the left hand side of the same figure is a rear elevation, both with a part of the shell removed, to show the interior arrangement.

The enlargement of the bore of this gun, by pressure of the powder, would require, therefore, the overcoming of the inertia of the weight of a frustum of a cone, without compressibility from each square inch of surface against which the pressure of the powder is exerted. The projectile being a cylinder, slightly elastic and compressible, its inertia would be more readily overcome than any frustum of a cone of the metal of the gun; having equal area at the surface of the bore, against which the pressure of the powder is exerted, its inertia would have to be overcome almost instantly throughout its whole length, because of its resistance to further compression; while the inertia of the shot would be overcome gradually, or



in successive disks of its length, because of its undiminished compressibility. The addition of the tensile strength of the metal makes it probable, therefore, that this gun cannot be burst by the pressure of the powder, if the shot is free to move forward. I suppose this gun has sufficient length of caliber to utilize nearly all the expansive force of quick-burning powder, the cartridge occupying not more than one-fifth of its length of bore.

The spherical form is an advantage, by allowing the gun to be simply rotated on its trunnions, in order to be loaded without exposing the men by the presence of any open port hole; and it is so nearly balanced upon its trunnions *H*, as to be worked with ease, notwithstanding its weight, fifty-one tons. It graduated on its periphery, for adjustment to the proper elevation.

The following illustration shows a pair of guns mounted in a turret, for a fort or water battery. The manner of mounting and operating is such as to allow them to be loaded without exposing the men to receive missiles

through the ports, and so arranged that the guns brace each other, and that the inertia of the entire structure is made available to resist recoil. It shows, also, the means adopted to facilitate the working and repairs on the guns and turret.

Figure 39 is a side elevation of two spherical guns, mounted according to this portion of my invention. The guns may be, in all respects, like that shown in Figures 5 and 6, or may be differently constructed, as may be preferred.

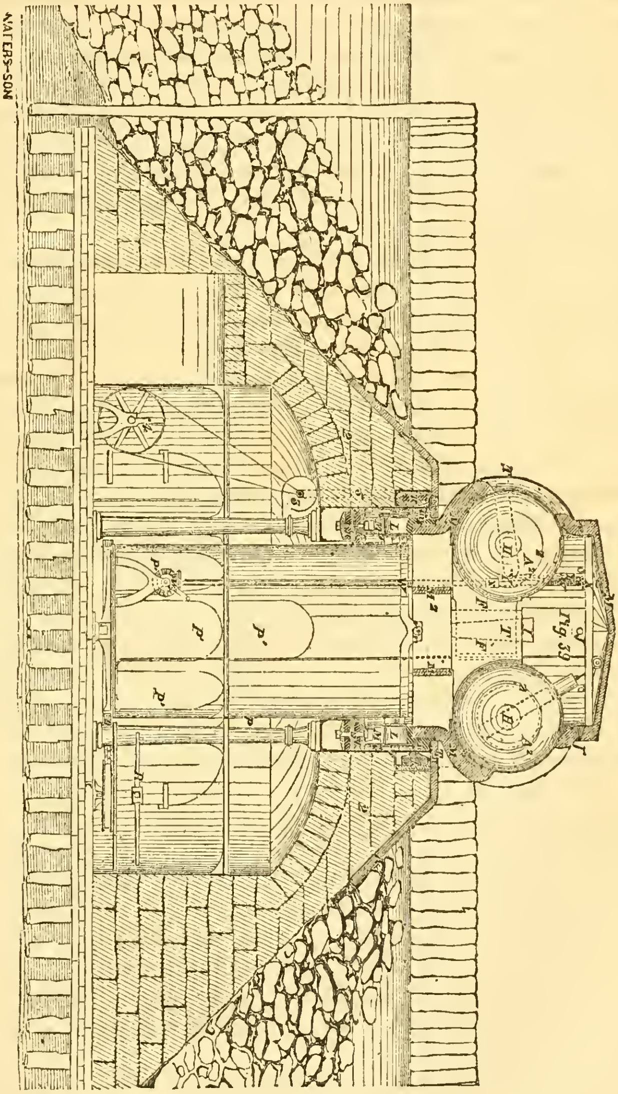


Figure 40 is a section across the turret, on the line *SS*, in Figure 39, with certain parts removed. Figure 41 is a horizontal section, on the line *TT*, in figure 39, with certain parts removed.

A^2 A^2 represent the guns The trunnions *H*, are mounted in bearings *G*, in the inside of the turret *M*, and the spherical form of the guns allows each to be rotated to any extent desired, without uncovering the port. Each gun moves inward to a small extent, before rotating it, the bearings *G* being adapted to allow such motion, and to induce it, by the gravity of the gun, so soon as the parts which prevent such motion are removed.

FF^1, are substantial cheeks, or movable braces, standing so that one is partly embraced and sustained by the other, and *I* is a stout wedge, adapted to operate between these cheeks, and, by their aid, to brace the guns outward very rigidly. I force outward both guns, so that they apply themselves firmly to the interior of the turret, before firing either. When the gun, represented on the right hand side of the figure, is fired, its tendency to recoil is resisted, first, by its own inertia; second, by the inertia of the cheeks FF^1, and wedge *I;* third, by the inertia of the gun, on the left hand side of the figure; fourth, by the inertia of the entire turret *M;* and, finally, by the elasticity of masses of rubber *K* and K^1, which are introduced in the manner represented.

On the scale represented, the guns are fourteen inches caliber, and weigh each fifty-one tons; and on any scale which may be assumed, each gun weighs about one hundred times as much as the charge which is fired therefrom. The recoil of such guns, thus braced and provided, will not be so great as to occasion serious inconvenience. *L*, *L*, represent rollers which support the turret *M*, and its attachments, and allow it to turn freely. M^1, represents the circular track, or stout ring, on which the rollers *L*, *L*, traverse. *N*, *N*, are holding-down bolts, which pass through the rubber *K*, and are adapted to allow much lateral movement. *P*, is a hollow cylinder of iron, provided at the bottom with large doorways P^1, to allow the ingress and exit of the men, and with gearing *Q*, and a capstan *R*, by which it is rotated. This cylinder is connected with the turret *M*, through the aid of strong pins or projections *V*, which stand in suitable jaws *v*, on the inside of the turret at its base, and compel the turret to turn therewith, while at the same time, allowing for slight imperfections in the adjustment of the parts, by the liberty of the projections *V*, to move vertically in the jaws *v*. *W*, is an endless screw, adapted to be rotated by the winch *w*, near the bottom of the structure. It stands near the rear face of one of the spherical guns A^2, and a like screw, not represented, stands near the opposite gun. *X*, *X*, are two nuts which are carried on the same screw *W*, and which are moved simultaneously, up or down, according as *W* is turned in one direction or the other. *Y*, Y^2, are wire ropes which are wound each partially around the gun, fitting tightly in a groove in a piece *Z*, bolted on the gun for the purpose. The rope *Y*, is attached to the nut *X*, and the rope Y^1, to the nut X^1, and both ropes are firmly secured to the gun. These ropes and nuts incline the gun in either direction, and to any extent which may be desired, by simply turning the screw *W* in the proper direction by the crank *w*.

I provide strong heavy beams M^2, M^2, across the base of the turret *M*, in the directions represented. These sustain the weight of the bracing parts, and resist that portion of the recoil which is directed downward, when the guns are fired at high elevations.

The iron covering 1, which is applied upon the masonry 2, around the base of the turret *M*, is very strong, and is held down by bolts not represented. A heavy flange *m*, extends outward from the base of the turret *M*, and stands under the inner edge of the iron covering 1. This guards the turret from being overturned by any chance, or by any severe recoil of its guns.

The blower 3, is operated vigorously by the crank 4, during an action, and by drawing in air through the pipe 5, induces a plus pressure in the entire structure. This pressure induces an upward flow of air through the cylinder *P P*, and turret M, the air finally escaping through apertures in the top of the turret.

There is an intermediate floor 6, in the cylinder *P*, and a ladder for moving up and down therein, may be arranged in any obvious manner.

Sight holes *J J*, are provided as represented, which may be furnished with mirrors, and other approved appliances, if preferred.

Figure 42 is a plain view, showing one of the rollers *L*, on which the turret *M*, turns, and the rings L^1, L^2, which connect the rollers, and compel them to maintain uniform distances, each from the other.

When it becomes necessary, from any cause, to take out or replace one of the rollers *L*, I have provided means of doing so, without lifting the turret *M*. Figure 43, is a side view of one part of the circular track M^1, where this is accomplished. A slight shaft, or guide spindle *l*, is inserted through each roller *L*, and the outer end is provided with a T-shaped part l^1, which is bolted to the outer ring L^2, as represented.

To take out a roller, I turn the turret until the defective roller comes to the position shown in dotted outline, in Figure 43. I then remove all the bolts which hold the several parts l^1, to the outer ring L^2, and raise or lower L^2 out of the way. I then remove the nut which holds the defective roller to the inner ring L^1, remove the guide spindle *l*, and the defective roller is then free, except that it is still supporting its share of the turret, and consequently cannot be drawn out, being prevented by the flange on its inner end, as also by the friction due to the great load resting on it.

I next remove the small portion M^3, from the circular track M^1, it being made in a piece separate from the other parts, to allow its removal for this purpose. I then turn the turret until the defective roller is brought over the place where this piece M^3 stood, as shown by the dark lines. The previous removal of the piece M^3, now allows the defective roller to be readily withdrawn, because it readily falls down by gravity out of contact with the turret M, leaving all of the weight to be supported by the remaining rollers; and the space made by the removal of M^3, is sufficiently wide and deep to allow the roller to be removed and a new one substituted; after which a reversal of the process, above described, makes all again complete. Figure 43ª shows a front elevation of spindle *l*, showing slight projections l^2, which hold l^1 in horizontal position, l^2 being removed.

There must, of course, be a suitable passage, at the point required, through the masonry, to allow access to the place in the circular track, where this operation is performed.

The fort above described was designed for New York harbor, to be erected in the center of the river at the Narrows, and for other like places.

The number placed in one channel can be as great as desired, but the size of the fort, or the number of guns for each fort, should not be increased.

The foundation may be on a rock bottom or on piling. The stone work could not be injured by an assault, for it is practicable to cover its small exposed surface with plating that would resist any shot. The piles driven about it would be a sufficient harbor breakwater, and the loose rock deposited about its base would insure safety against an assault by rams.

The men and magazines are placed below, so as to be protected, and the turret may be of any required thickness. There is no opening through which the smallest projectile could enter, and no men in the turret to be injured if there were. The guns are absolutely safe from bursting, and of a size to throw a projectile that would crush any ship that can be floated into a harbor. I offer it as an impregnable fort with irresistible guns. It can be constructed in less time and at less cost than any equally efficient means of defence.

The hour for adjournment having arrived, Mr. Wiard proposed to continue his remarks at the next meeting.

Mr. Edward Cooper asked leave to interpose an explanation of his position on the rupture of heavy guns; claiming that he, rather than Mr. Wiard, was entitled to the credit of the discovery, and inviting the attention of the authorities to the fact that heat rather than strain was the cause of the rupture of large guns.

Mr. Wiard briefly explained his theory, averring his belief that he was the earlier discoverer, and related some of his experience and failures in making steel 50-pounders. He used the same form of gun with this material as Captain Dahlgren has used successfully with cast iron. They worked well on firing a great number of times slowly, but on firing fast, while the exterior was cold, and in cold weather, all soon burst. He believed it due to the heat on the inside expanding, the middle remained small as at first. Two burst on the ninth round each. Steel differs from cast iron in this respect. The Rodman system of casting iron around a cool core is, however, more like a steel gun.

Mr. Cooper asked if guns at the battle of Malvern Hills were fired by their heat alone.

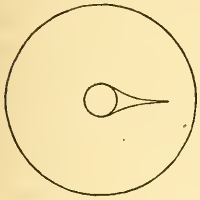
Mr. Wiard did not believe this ever had occurred.

Mr. Clinton Rosevelt presented a theory of his own in regard to the explosion of guns: he averred that the rupture began on the inside, and could not, therefore, be produced by heat.

Mr. Wiard maintained his previous opinion, and thought it was proved by the fact that the modern tapering (Dahlgren) gun is hot on the outside, first at the muzzle where it is thin, and that the heat comes to the surface at other points in lines directly proportional to its increased thickness of metal.

Mr. Wiard exhibited diagrams of a cross section of a cylinder, to answer the objections of Mr. Rosevelt. The fracture begins on the inside. This would seem to prove that guns burst by pressure rather than by expansion of the inner metal—as if the inner metal were expanded by the communication of heat before the outer metal gave way—*a strain of compression* resisted by the strength of the outer metal would rest upon the

inner metal of the gun that would prevent fracture; and, undoubtedly, if it ever occurred to an ordnance officer to inquire whether the communication of heat to the inner metal of guns was the cause of their failure, the beginning of fracture on the inside would appear to him an argument against



the theory. This I consider a critical point, but one directly favoring my theory. It repuires a most familiar knowledge of the effects of heat, and a careful recollection of time and place of all the phenomena, to comprehend and explain this part of the subject. The accompanying diagram exhibits a cross section of a gun at the point of greatest pressure, and, consequently, highest temperature; the surface of the bore is supposed in this example, to be *continuously* exposed to the high temperature evolved from the combustion of powder when its expansive force is resisted by the inertia of a heavy projectile, or, *as if a fire were constantly burning within the gun.* The space *between the curved lines* represents the place and quantity of heat thus communicated to the metal, showing the greatest expansion immediately at the surface of the bore.

To represent a reduction of temperature by lines converging towards each other I know is unusual, but as no conventional lines have been adopted to represent intensity of heat by their direction, and as I have confidence my meaning will be understood, I have chosen to use them in this manner.

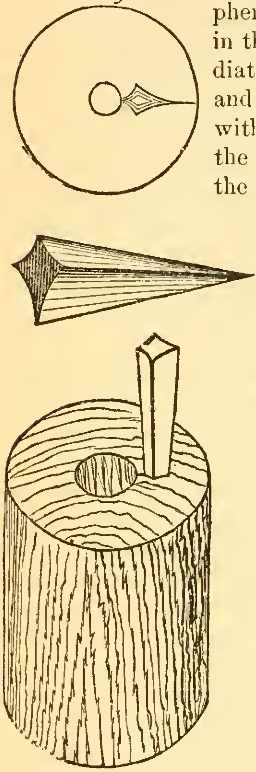
We are to recollect that, in the most rapid firing, the surface of the bore is exposed to this high temperature only about one hundredth part of the time, while during the other ninety-nine hundredths the heat of the surface of the bore is radiating away. If the diagram represented a gun of six inches diameter of bore and eight inches thickness of metal about the bore, the range to which the heat would penetrate the metal at the first discharge would be about four inches; for heat enters metal with a velocity depending on the difference in temperature of the source from which it flows and the metal into which it is flowing. The heat is communicated to the *small* surface of the bore, while it is radiated from the *large* outside surface of the gun; from this cause, if from no other, the temperature would be much higher within the mass than on the outside.

The penetration from the first discharge being four inches, it might be supposed that the range of the heat from the next discharge would be greater; but heat having been communicated by the first discharge, the range of the second is less, from the reduced difference of temperature. Although, of course, the heat flows onward, its motion is very slow. If, then, the penetration be four inches, at the distance of four inches from the surface of the bore the temperature will be comparatively low, but little higher than that of the metal at four and a half inches from the surface of the bore. The heat, therefore, is conducted from the point of four to that of four and a half inches slowly; more slowly from that of four and a half to five, and with a continually reduced and very slow rate of motion to the outside.

As the heat is communicated from one inner stratum to the stratum surrounding it, for each inch of the increasing distance it travels, the mass of which the temperature has to be raised is greater in circumference also;

this is another cause of the retardation to its motion outward. Although for ninety-nine hundredths of the whole time the heat is radiating from the surface of the bore, the velocity with which it leaves is much less than the velocity with which it is received, because the difference in the temperature of the gun and the atmosphere occupying the bore is much less than the difference of temperature between the metal of the gun and the gases ejecting the shot by their pressure. The atmosphere occupying the bore receives the heat by radiation, in the intervals between firing quickly from the immediate surface, and less quickly a little distance beyond; and so again the heat flows from the metal of the gun with reduced velocity as the distance increases from the bore, leaving the point of highest temperature in the mass of metal, but not far from the surface of the bore. (*See Fig.* 13.) Its effect toward causing rupture may be illustrated by taking a cylinder of pine wood a few inches in length and a cross-section like the diagram, and providing a wedge similar in form to a bayonet, but truly tapered to a point from a cross-section at the head, the same as the lines representing the place and quantity of heat on the diagram, showing its effects by *intermittent communication* of heat. (*Fig.* 13.) If the point of this wedge be set upon the end of the wooden cylinder at the point supposed to be the point of greatest heat, according to the theory above, and by a blow driven into the end-wood, it will penetrate so as to make an impression like the inner line of the diagram. A second blow, driving it further into the wood, penetrating as if to the second line of the diagram, and expanding the wood, *will cause a fracture inward toward the surface of the bore, first;* a third or fourth blow will split it to the outside. And thus guns burst, *the first fracture occurring on the inside, and afterward opening to the outer surface.*

Fig 13.



Mr. Edward Cooper was of opinion that guns generally burst through the vent.

The question was continued to the next meeting, and that of "Inland Navigation" was selected for the 9th of January.

Adjourned. THOMAS D. STETSON, *Secretary.*

AMERICAN INSTITUTE POLYTECHNIC ASSOCIATION,
December 18, 1862.

The Chairman, S. D. TILLMAN, Esq., presiding.

Mr. Stetson, the Secretary, exhibited to the meeting specimens of the fiber of Sisal hemp, also some of the raw material, green leaves of the cactus species—the Axgave Americana, several feet in length. This material

has long been prepared by the Indians of Yucatan, using very primitive apparatus, enabling one man to prepare about four or five pounds per day of fiber. Machinery has lately been introduced, which was explained by Mr. S., for preparing the fiber. He alleged that one machine attended by two men or boys in ten hours would produce 500 pounds, better cleaned than by the primitive process. He believed it was a fiber entitled to much attention. Some of the waste, a short fiber, was now in the hands of Mr. John Priestly, an extensive manufacturer of this city, and paper from it would be exhibited at a future meeting of this Association. Some fifteen tons of this waste had been recently brought to this port, but for what purpose or price, he Mr. S. had not learned. He believed the machine described, which was the invention of Mr. E. I. Patrulla of Merida, an extensive cultivator of this material, was a curiosity as a very marked example in which extreme simplicity and great economy of production had been reached through experiments with more complex and inferior apparatus. The machine now is little more than a drum with teeth, running in a tight case.

The Chairman.—I have the pleasure of introducing to the meeting Mr. Hyslop, who will make some remarks on ventilation, and illustrate the action of air currents in rooms; and conclude by exhibiting Mr. McKinnell's ventilating apparatus, which was several years since patented in England, and is extensively used there.

Mr. Hyslop after some remarks upon the importance of perfect ventilation, proceeded to give a practical illustration of this subject.

He showed that an opening in the top of a room, or a pipe of any kind carried from the ceiling to the outside and above the roof, would not alone remove foul air; he placed three lighted candles under a glass shade which had a large opening through the top of it; the oxygen of the air was soon so far exhausted that the lights were extinguished; he next repeated the experiment, placing an open tube upon the opening, such as are commonly used for carrying off foul air from public buildings, and the lights were extinguished as before; he then relighted the three candles and placed them under the glass shade and about three inches apart, in the form of a triangle; he fixed an open tube in the opening on the top of the shade, and raised the lower edge of the shade on one side, by putting the point of a pencil under it, opposite the center light; this admitted a free current of air, which came in at the bottom and went out through the tube at the top; the effect of this was that the light opposite the opening made by the pencil was kept burning brightly, but was agitated by the draught, whilst the lights on each side of it were extinguished by the deficiency of oxygen in their locality; he argued from this experiment that the lower part of a room was the wrong point at which to admit fresh air, as it passed through the room without diffusing itself, causing inconvenient draughts where it went, and leaving some parts unvisited.

He then covered the opening in the top of the shade and placed three lights in it at different levels; one near the top, one at the bottom, and one about midway between the other two; no change of air was allowed, and as the carbonic acid began to accumulate the lights were extinguished; the highest first and the lowest last. Mr. Hyslop showed by this that carbonic acid ascended to the ceiling, and accumulated downward from that

point when it was not allowed to escape, the upper part of a room always being most impure.

He next exhibited a model of Mr. McKinnell's patent double current ventilator, in operation. The ventilator consists of two tubes, one within the other, leaving a space between them; the inner tube is the longer, and projects above the outer tube at its upper end; both tubes terminate at their lower ends on a level with the ceiling, but fitted inside the bottom of the inner tube is a short sliding piece, to the lower edge of which is attached a circular flange, which projects outward parallel with the ceiling, and conceals the opening of the outer tube when viewed from below; both tubes are properly protected on the outside by cowls. The action of the ventilator is as follows: The greater length of the inner tube determines the upward current to take place in it; it therefore becomes the foul air shaft; the outer tube becomes the fresh air inlet, and the descending current striking against the flange is thrown out on the plane of the ceiling, and so diffused; by the use of valves the action of the ventilator can be increased or diminished at pleasure.

The ventilator was fitted into the hole in the top of the glass shade, which was used to represent a room; a piece of thick blotting paper was lighted and then the blaze blown out, and the smoking paper held outside the fresh air entrances; the descending current of fresh air took in with it the smoke, which showed the course of the air as it passed inward and over the flange, which threw it out equally in every direction, passing down by the sides of the shade and finally passing upwards in the center, making its escape up the outlet pipe as foul air; a candle was kept lit under the shade, which burnt brightly, but without any agitation such as would have indicated an inconveniently strong draught.

A modification of the same plan of ventilation was next exhibited, which showed how the lower rooms of houses might be ventilated without the rooms above them being interfered with; the fresh air is brought in from the side of the house by pipes laid horizontally betwixt the beams in the floor above the room ventilated, and is diffused from the ceiling in the center of the apartment; the foul air is carried along horizontally in the same way, to the outside wall, and the pipe is then carried up vertically in the wall for a few feet, or in some cases to the top of the house, and the air then allowed to escape.

Mr. Hyslop was listened to with great interest, and some of his experiments elicited hearty applause.

Mr. Fisher then explained, by means of diagrams upon the blackboard, the patented balance piston valve of T. S. Davis, as applied to locomotives.

Unlike ordinary pistons, the head and follower are of considerably less diameter than the ring, which is counterbored to receive them. The width of the ring is equal to the entire thickness or depth of the piston, its edges being flush with the outer faces of the head and follower. The latter are held together, and held tightly upon the counterbored shoulders in the packing ring, by being placed on the valve stem, with a nut on each side of the piston. The head and follower are tightened against the inner shoulders of the ring, and not upon each other, for the head does not extend so far through the piston as to allow the follower to take its bearing upon it.

The cast iron ring is cut open at a single point, the cut being made square across the face of the ring, and of such shape as to receive a dovetailed key which may be set up by a screw so as to expand the ring, and bear on its outer face against the inner surface of the cylindrical steam chest in which the valve moves. The steam ports extend around the whole circumference of the steam chest, and admit steam at their outer ends only. The valves are necessarily balanced, and work with hardly any friction. From their construction, the ring cannot be blown in, or reduced in diameter, by the direct pressure of the steam, when the piston is opposite the steam port; nor can it expand outward, except as it is forced open by direct pressure in screwing up the dovetailed key, and the length of the pistons in proportion to the width of the posts is such that no blow or shock occurs as the pistons pass the ports. An objection to piston valves has been urged in former times, that from unequal expansion of the valve they would stick, but in Mr. Davis's plan the steam first surrounds the inner case in which the valve moves, and becoming heated before the valves, renders it impossible for them to become fastened.

The regular subject, "Improved Modes of Modern Warfare," was then taken up.

Mr. Geo. Bartlett exhibited and explained the Burnside rifle, invented by Major-General Burnside.

It was just brought out, and very highly approved, after trials before a commission in the year 1857–8, but the manufacture did not succeed well. Since the commencement of the present war it had been again renewed, and a company in Providence are now making about 2,000 per month. The arm was preferred, for cavalry use, to any other.

Dr. Rich asked why this was superior to other breech loading arms. It seems to have been so pronounced by the commissioner of army officers.

Mr. George Bartlett.—I believe it is mainly ascribed to the solidity with which its parts were applied together. I do not know how fast it could be fired, evidently not so fast as those which carry the percussion material in the cartridge; this is used with separate caps.

Mr. F. Dibben said rapidity of fire was not as important, for war purposes, as accuracy, durability, strength, or force of its shooting. The Burnside rifle excelled in these, and especially in the provision for fitting the plug tightly, at all times, in the barrel.

Dr. Rich thought rapid loading was a very great *desideratum.* It was certainly no disadvantage to load rapidly even if it was not desired to fire rapidly.

Mr. George Bartlett said this was a good target rifle, the only one, he thought, of the breech loading class, which had worked well for such purpose.

The Secretary said the difference in time of loading, between the common muzzle loading and any breech loading arm, is much overrated. He had, on a test trial, loaded and fired four times at a target in less time than a friend had operated a breech loader at his side. He had found Mr. Lewis, president of the National Rifle association, in favor of muzzle loading pieces alone.

Mr. Norman Wiard said a great advantage in the breech loading arm, lay in the greater number of times a piece could be fired without heating. He said much heat was stopped by the copper case, and prevented from striking into the gun.

Dr. Rich advocated the kind of arm known as the Maynard Rifle. These, and other breech loaders, have been fired fifteen times per minute. Muzzle loaders cannot be fired as fast.

Mr. George Bartlett spoke in favor of the Clark's Patent muzzle, which is applied to cover and protect the muzzle of a rifle while loading.

Mr. H. L. Stuart, the associate of Mr. Wiard, stated that all of Mr. Wiard's inventions and improvements in ordnance had been made independent of all assistance or co-operation of the government ordnance authorities, and, in fact, in the face of discouragements and direct opposition on the part of the chiefs of the ordnance bureaus. He said that after a prolonged and careful investigation, he was fully satisfied that no radical or really important discovery or improvement in the method of fabricating great guns had been made by the ordnance bureaus of the army or navy, and that the real cause of their bursting, viz: unequal expansion by the great heat, 6,000° Fah., resulting from the combustion of gunpowder, had never been considered at all by the ordnance authorities. He said that he believed that Mr. Wiard had discovered the true cause of failure, after long study, and a large expenditure of time and money.

Mr. E. Stevens thought all the breech loaders would shoot nearer than common soldiers could see; in his opinion either style of gun therefore would do for accuracy.

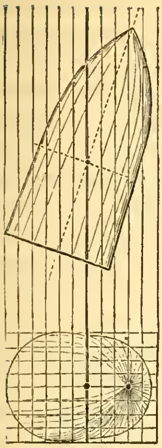
Mr. Stetson called upon Mr. Wiard to explain the mode of taking in the air which he had invented for iron clad vessels, and adverted to the fact that Mr. Wiard does not content himself with merely finding the faults in the vessels already built, but brings out definite plans for remedying them.

Mr. Wiard proceeded to explain by diagrams his mode of taking the air through hollow columns and hollow deck beams from a great multiplicity of holes on the deck. Provision was explained for drawing foul air and rejecting either water or the gas from any burning mass presented to any portion of the deck.

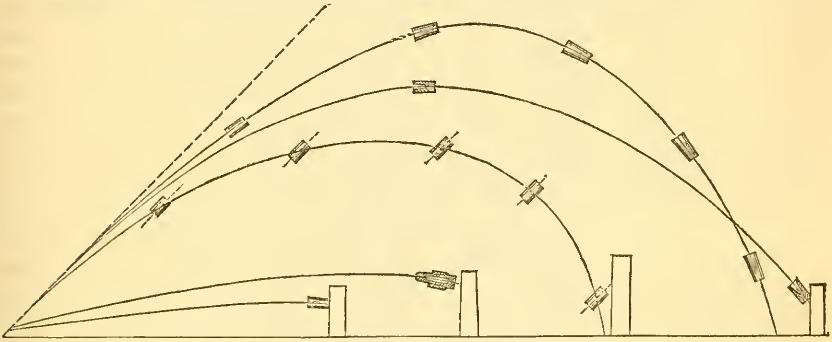
The exhaling of the air through the wheels or screws encased within the vessel and only projecting through the bottom was further explained. It would, among other advantages, make the vessel appear less like a steamer, and would appear to be but a sailing vessel.

Mr. Wiard proceeded with his remarks, and spoke of "projectiles" substantially as follows:

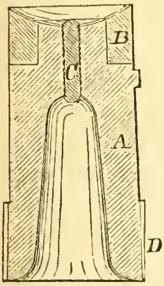
HOW TO MAKE PROJECTILES.



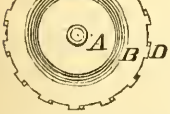
A variety of new forms of projectiles are required for these guns, as the necessity for large guns comes from the important changes in the mode of constructing ships of war covered with iron armor, and the projectiles for attacking these, successfully, must be the same, whether the enemy were opposed by our guns on ships or fortifications. Those here represented are solid shot and shell, 14 inches in diameter, and 28 inches in length. All these projectiles, it will be noticed, have their greatest displacement (as they are projected through the air) at their rear end. But their center of gravity is forward of their center of form. A shot fired from a rifled gun at high elevation, is inclined to keep the same direction or angle of its axis, about which it revolves, and during the last half of the trajectory this direction comes to be nearly a right angle to the direction of its flight. The resist-

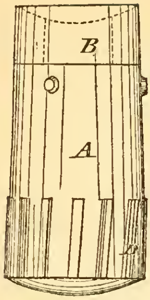


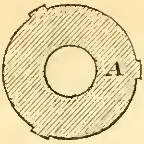
ance to its forward motion is as its displacement of air. If its greatest displacement be aft, the resistance of the air (when the projectile is moving in the direction of the parallel lines) against its sides, inclines to bring the rear end of the shot backward, so that its axis coincides with the line of flight. The center of gravity being forward of the center of form, would assist in depressing the forward end of the shot, as the line of the trajectory was depressed. The figures show a longitudinal section, and a rear view of one form of my invention, which has the required qualities to an eminent degree, and is thus adapted to the penetration of iron armor plates at a long range with a high trajectory, striking point foremost.

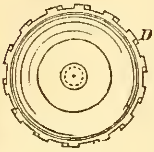


The main body *A*, of the projectile, is of cast iron; the ring *B* is of steel, hardened. The front of the projectile is concave. The screw bolt *C*, is of iron, and merely fills a hole which is made by a suitable core in casting, to secure more uniformity in the metal while cooling. The rear portion is provided with projections *D*, adapted to correspond with, and fill as closely as desirable, the rifle grooves of the gun; and the orward portion is provided with three *boutons* or projections E, which may



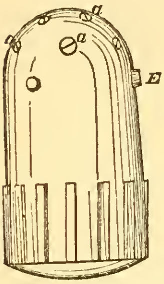


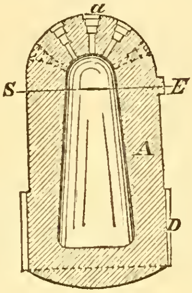


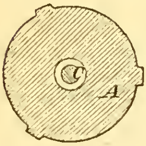


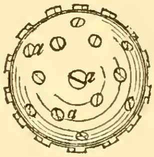
rest upon the lands of the gun, and which compel the forward part of the projectile, though smaller than the bore, to maintain a central position therein. The next figures are a front view and a side view of another form of projectile, intended to operate against iron armor, at short ranges. It is solid throughout, and differs but little from the long range projectile described, except that it has not the hollow rear—it is cored and filled with a screw bolt *C*, in the center, as already described.

The next four figures are an elevation, and to secure uniformity in the casting, a section of a hollow shell with a rounded front, and a cross section of the same on the line *SE*. This shell is provided with thirteen plungers *aa*, etc., adapted to explode by concussion. These radiate in so many directions, that some one may explode if the shell strikes in any position. A time primer is added, when it is required that the shell shall penetrate before explosion. This shell is adapted to be thrown inside of forts on elevated positions, or into cities, where from the height of the trajectory, it has been heretofore difficult to insure the explosion of percussion shells. It will usually explode upon striking, if it is tumbling end over end, and on striking in any position, excepting that of a fair blow with its rear end.

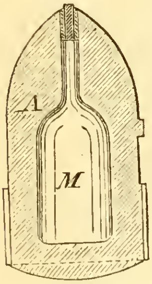


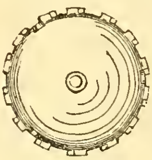






Another kind of shell is shown, and the figures are a side view and a front view of a projectile intended to act as a time shell, and which is adapted to receive an ordinary or any improved form of time fuse. This shell is constructed according to the theory hereinbefore stated, and the greater weight in the forward part of this projectile, when the cavity *M* is filled with powder alone, is very marked, while the greater displacement of the rear portion of the shell, and the *boutons* to steady the small front portion in the gun, are like the projectiles previously described.





AN ACCELERATING GUN.

The attainment of a very long range, or the penetration of iron armor, requires the highest velocity possible to be attained. To meet this necessity I have provided a gun, in which the length of the gun is proportioned to the size of an enlarged chamber that contains the powder, from which is evolved a sufficient quantity of gas to keep a high expansive force

against the shot a longer than ordinary time, and the use of this device is made practicable by the devices of compensation, and modes of attaining great strength exhibited in the spherical guns hereinbefore described.

Fig 32

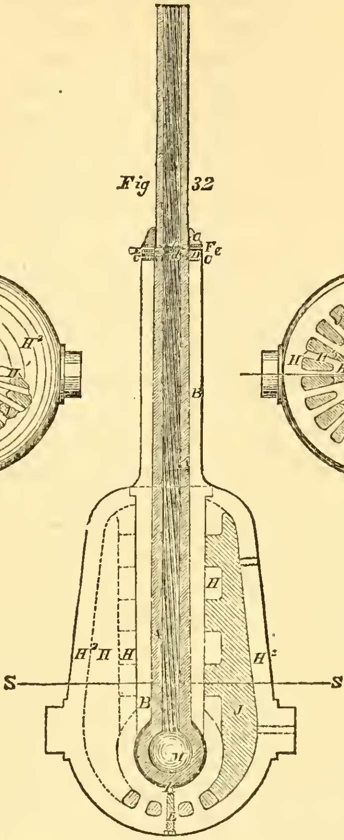


Fig 34

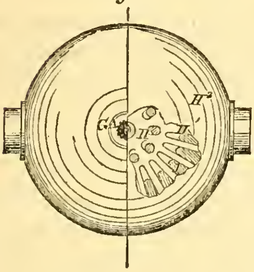


Fig 33

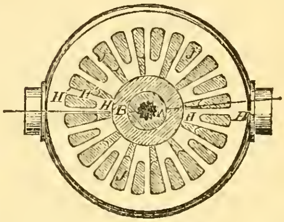
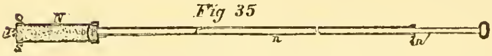


Fig 35



The figures represent a longitudinal section of the gun, and a cross section on line *SS*; also, an end elevation, the right hand side being an elevation of the rear end with a portion broken away, and the left hand side an elevation of the front end. *A* is the inner lining of steel constructed in the form represented, so that there is a chamber *M* larger than the main bore of the gun. This chamber *M* is bored without difficulty, by means known to workers in metal, and contains, in a form adapted to facilitate its rapid ignition, a much larger quantity of powder than can be burned, with advantage, behind a shot in guns of the ordinary construction. *B* is a covering of bronze forced tightly upon the lining *A*. The inner surface of *B* and the outer surface of *A* are tapered slightly; the rear end of *A* being largest. This facilitates the production of a very tight fit of these parts, but care must be taken that the thickest part of the steel lining *A* be not too great. I prefer to make this thickness, if the gun be large, about three

and a half inches, as otherwise the difference in the temperature between the inner and outer particles induces a serious strain.

C, *D*, *E* and *F* are heavy washers of steel, prepared with a spring temper, and touching each other only at a few points by the aid of the projections, *d*, *e* and *f*, arranged each in a different part of the circle from the next, so as not to coincide in position, but to differ as widely each from the other as possible. This, as will be readily understood from the drawing, allows the elasticity of the washers to be brought into play.

G is a nut fitted upon the steel *A* by a screw thread, as represented. This is applied against a washer *F*, with considerable force, so as to compress or bend, slightly, all the washers between itself and the washer *C*, resting against the bronze *B*.

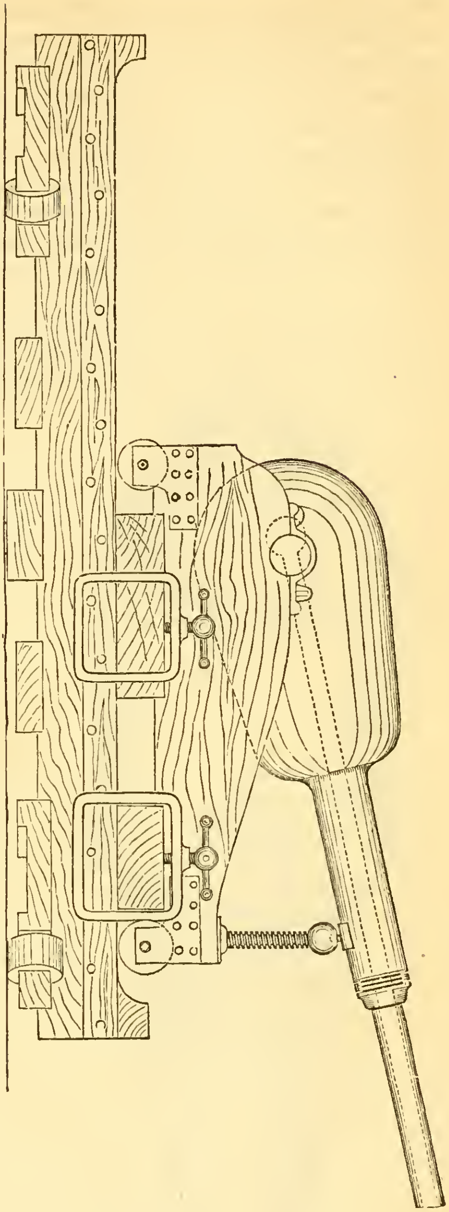
H is the inner shell, and H^2 the outer shell of a bronze casting which is forced, or shrunk on, over the parts before described. This casting is filled with lead, *J*, and compressed, and is provided with braces, H^1, which connect the inner shell *H*, with the outer shell H^2. A quantity of lead, *K*, is also introduced between this casting and the spherical chamber, and held by a screw, *L*.

It will be seen that this gun possesses compenstion for unequal heating, which forms so conspicuous a feature in some of the guns before described, and, in addition, stores in its capacious chamber *M*, so large a quantity of powder, and allows it to burn so quickly, that the great initial pressure, which is usually felt by the projectile during the early portion of its movement, is continued further than usual toward the muzzle, acting a greater length of time against the shot to accelerate its motion, analogous to the motion of mercury in the tube of a common thermometer, due to the expansion of the large quantity of mercury contained in the bulb. If a thermometer was constructed without the bulb, the expansion of the mercury in the tube, only, would not be sufficiently apparent to give room for graduations, but by the addition of the quantity in the bulb, affected by the change of temperature, the motion along the tube is very great, and can be proportioned to give any required amount of motion in the tube, if the bulb could be made to resist the forces acting upon it. And these are exactly the conditions required in a gun, to attain the highest velocity. I believe my mode of constructing this gun, will allow the successful use of this idea, but without my plan of compensation, the structure would be destroyed by the joint effects of the high mechanical pressure and the heat to which it would be subjected.

Figure 35 represents an implement I have designed, for loading such a gun. *N* is a cylinder of copper, and *n*, is a hollow wooden stock, by which it may be reached into the gun. n^1, is a stop which rests in and against the muzzle, when the loader is fully in place. The cubical contents of *N*, are equal to that of the chamber M, of the gun.

An elastic disk, or wad *O*, is placed upon the convex face of the plunger *P*, then the powder for a charge is introduced into *N*, next a sheet of paper *R*, is placed over the end of *N*, and, lastly, a ring *S*, is slipped over the edges of the paper, holding it strongly to *P*. The loader and its contents are next introduced into the gun, until the stop n^1, rests on the muzzle. The plunger *P*, is then forced inward by the rod *p*, passing

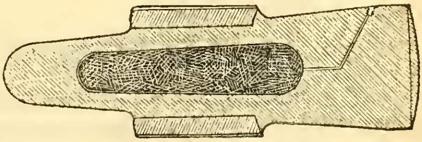
through the stock *n*, bursting the paper *R*, and shoving the powder *Q*, into the large chamber *M* of the gun, and also forcing the wad *O* in and allowing it to expand into such bore, so that it will retain the powder. The loader is now withdrawn, and the projectile introduced in the ordinary manner. This avoids the trouble which might otherwise be met in filling the chamber *M*, with powder, while the gun is in a horizontal, or nearly horizontal position



LONG RANGE GUN MOUNTED ON PIVOT CARRIAGE.

A pivot carriage adapts this gun to be used on the deck of such ships as the Vanderbilt or the Niagara; and if the speed of the ship was greater than any iron clad, this gun would enable us to defeat all the iron-clads in the world. The gun is susceptible of such adaptation, by increasing the size of the chamber, and proportionately the length of bore, as to give the highest possible velocity to the shot; and, by the principle of compensation, can be made of any required size practicable to be carried on a ship with perfect immunity from bursting. By placing the nut of the elevating screw on a spring, the muzzle of the gun can conform to the direction of the shot as it passes along the bore without breaking off the muzzle, heretofore shown to be a fault of guns as ordinarily mounted.

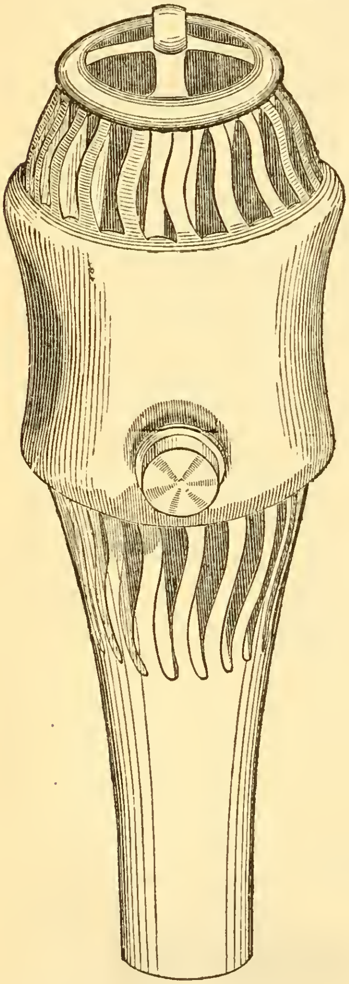
When a shot is projected against iron plates from a rifled gun, it is reduced in length and enlarged in diameter, so that it would fasten in the hole it had made in the plate. The shot here shown in section is constructed with its largest diameter at the front end, and the main body tapers toward the rear end, except

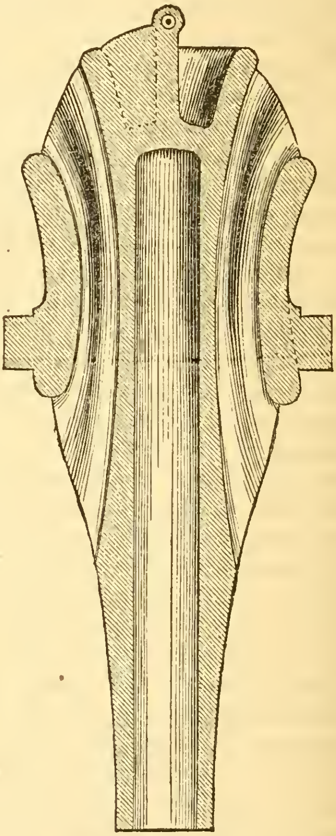


at the place where a sharp edged collar is placed to prevent a soft metal band from being forced out of the gun in advance of the shot. The soft metal band will take the grooves and give the shot the rifled motion, but will not hinder the shot in its passage through iron plating, against which it is projected. When used as a shell, it is intended to ignite the powder it contains by the heat of compression resulting from the blow against the plating. The small inclined and inclosed tube is intended to contain common powder, and it is inclined toward the front of the shell that the compression may not entirely close the passage to the powder contained in the cavity of the shell, but rather only close its front end first.

GREAT CAST IRON GUNS.

The last gun I shall describe, exhibits the result of my efforts to produce a cheap gun of larger size than has been before produced, constructed, how-

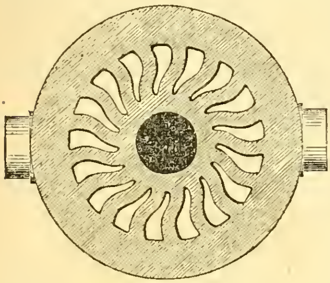




ever, with full knowledge of all the effects of combustion of the powder by pressure, as laid down by ordnance officers in books heretofore, and the

effect of heat discovered by myself. In this gun I provide strength to resist the pressure of the powder, while I compensate for the effects of heat, by superior elasticity, not only for the unequal expansion in the direction of the diameter, but of length also. The gun is to be cast so near to the required dimensions as to need no turning outside, thus preserving the most enduring surface to the casting, and allowing it to compensate by increased elasticity effectively for unequal heat in its inner and outer portions when made of one metal, as homogeneous cast iron.

The figures are a longitudinal section and a cross section of a gun constructed according to this invention. The passages are cast with cores to leave webs in the doubly curved form represented. The cores between the webs, as also a core forming the bore, may be cooled by tubes containing water or other cooling agent, in the manner patented by Captain Rodman, if preferred.



When the gun is fired, the heat communicated to the interior surface expands the central portions of the casting. The open condition of the iron intermediate between the inner portion b and the exterior portion b^1 of the thick part or re-enforce of the gun, allows this portion of the structure to yield by its elasticity, both laterally and longitudinally, far more than when the gun is cast solid; so that the strain, whether purely mechanical, *i. e.*, due to the expansive force of gases, or due to the heat of the interior, or, as will generally be the case, due partly to both, is allowed for, first, the pressure by the strength of the re-enforce; second, the expansion due to heat, by the elasticity of the webs. The re-enforce being cast of a somewhat greater thickness than other parts of the gun, will cool last, and shrink to the required pressure against the webs, and through them upon the inner metal. I can furnish these guns for five cents per pound, there being no machine labor necessary upon them except drilling the vent. I propose to cast the bore so near the proper size as not to require boring, and thus leave about the bore the most enduring surface. The gun, too, being cooled from so much surface, will be of a more uniform structure than has been before attained.

I am a manufacturer, and whatever facility of adaptation I may exhibit, is directly devoted to arranging plans for the purpose of making proposals for the manufacture of the work designed in a practical manner, with a view to that end only. My designs are the result of long study and close application, assisted by a long practical experience in constructing machinery and working metals. Whenever exhibited, these plans have received a hearty approval from practical men.

I have specified three general plans for the fabrication of large guns, adapted to the various requirements of service. The spherical gun and turret will answer as well for an iron-clad ship as a ram, although the weight of the gun and the thickness of the turret are greater than those heretofore proposed; the smaller diameter of the turret enables me to construct it to have no greater whole weight than the Ericsson turret with its guns; and when so constructed, it is a smaller object to be aimed at

by hostile guns. The lightest of its projectiles, the one with the hollow rear, weighs 780 lbs. When this shot is used, the cubical contents of the bore and the hollow base of the shot are about six times the cubical capacity of 60 lbs. of fine powder, and that charge would thus be well utilized, giving a respectable velocity to the greater weight of projectile than has ever before been thrown. No ship can be made to carry plating that will resist it, except its size is so great that it cannot enter any of our harbors.

These guns, adapted to such tremendous projectiles, can then be mounted in turrets of such thickness of iron as to resist projectiles from any other gun now made, or likely to be made, if the turret rests on a solid foundation, as in the fort proposed for harbors; and will afford absolute protection to them without involving extravagant cost of either money or material. The accelerating gun described is available for fast wooden or iron steamships, and, from the extraordinary velocity they impart to the projectile, will penetrate iron-clad ships at very long ranges.

The cheap cast iron gun completes the list, and is available for other requirements of service, for which large calibers are desirable, and as the principles involved in my statements only affect large guns, I shall discuss the subject of small guns at another meeting.

Adjourned. THOMAS D. STETSON, *Secretary.*

AMERICAN INSTITUTE POLYTECHNIC ASSSOCIATION,
December 26, 1862.

The Chairman, S. D. TILLMAN, Esq., presiding.

Mr. J. H. Churchill alluded to the difference of gases, and thought the fact that two gases in separate chambers would each expand into the other without change of heat, proved the truth of the dynamical theory of heat.

Prof. Seely, Mr. Dibben and Mr. Bartlett differed from him, and thought the action was a mere mixture and not properly an expansion of either gas.

Mr. J. K. Fisher doubted the theory that the gases would intermingle so rapidly as each gas would flow into a vacuum.

The Chairman read from the Transactions of 1857, the report of his remarks made on June 10, of that year, on the practicability of a telegraph to Europe by way of Behring's strait. He added that news has now arrived that the Siberian portion of the line is now being rapidly progressed with; a line has been nearly completed from St. Petersburg eastward to the Amoor river, while our own lines have been extended to the Pacific.

The regular subject, "Improvements in Modern Warfare," was then taken up.

The Secretary explained some of the recent improvements in fuses which have been lately invented and introduced with success for rifles, cannon and shells.

He described and explained particularly Schenkl's fuse, already largely introduced into the service.

Mr. J. K. Fisher said that it is shown by recent reports, that the Whit-

worth shells, before alluded to, did penetrate and explode behind $5\frac{1}{2}$ inch iron plates. They were exploded by the heat of compression of the iron in striking.

Mr. J. H. Churchill doubted whether the heat of compression was the cause of firing.

Mr. F. Dibben alluded to the facts and theory with regard to large guns, brought forward by Mr. Wiard at a previous meeting. The heat he (Mr. D.) thought could not expand the inside so as to very greatly affect the strength of the gun. In the old way of testing guns by firing many times with extra charges, more than half those failed on the first fire. He had seen it in six different cases of trials at Kingston, N. Y. Iron is stronger as it is heated up to 200° or 300° F. Experiments had as yet failed to show how far the heating beyond these degrees would improve the strength, but it had been determined that elasticity was of more value than actual tensile strength in cast iron. Greenwood iron would spring very sensibly.

Mr. Wiard remarked that wrought iron would bend still further.

Mr. Dibben confessed that elasticity was not the only quality required. Hardness and stiffness were also necessary. Mr. D. referred to the shortness of the bore of Mr. Wiard's design for a spherical gun of three different metals, and thought a longer bore, with slow-burning powder, would serve more efficiently to project the ball. Mr. Wiard proposed to make his bore only about five calibers long. The old plan for small arms was to make them sometimes thirty calibers long. This was now shortened with good effect, but he thought five calibers were too short.

Mr. Wiard explained that he rated his guns to the length of cartridge. He thought that about five times the length of cartridge was a good proportion for nearly all arms, to get the best possible projectile force from the powder.

Mr. Dibben thought the heat produced by the burning of gunpowder in a space absolutely confined, was about ten thousand degrees Fah., and presented several grounds for the opinion. Powder in firing and cooling down the gases, occupies a space about 270 times that occupied when in a solid state. If the cooled gas was again compressed suddenly in a non-conducting vessel to its original volume, its heat, by the known laws of heat due to compression, would be about that above given, *i. e.*, 10,000° Fah.

Guns were often weakened by unequal cooling, due to the construction of the flask in which they were cast. He had cast a number which on extreme test burst along the lines of the junctions of the flasks. Guns could be cast without trunnions in a one part flask. The heat of the interior, as at first stated, was not sufficient to burst or greatly weaken the gun.

Mr. Bartlett explained the theory of Mr. Wiard and Mr. Reid, in ascribing the rupture of guns in part at least to heat.

Mr. Wiard confirmed the estimate presented by Mr. Dibben, of the temperature of the gases of powder, but differed from him in believing that it had a very serious effect on the gun in expanding its interior. The temperature of 10,000 or more, exactly 10,800° F., was many times that of melted iron, and he had believed, until recently, that he was the first to show that it had or might have very great influence in bursting guns.

Slow powder acts more equally on a gun, by reason of not fully burning

until the shot is near the muzzle. Quick burning makes no more heat or power, pound for pound, but applies it to more advantage by acting with greater force at the beginning, and the same near the muzzle, as slow powder, if the guns will bear the strain. He (Mr. W.) proposed guns that should endure this strain and consequently would allow of the advantageous use of quick powder.

Mr. Dibben explained on the blackboard that the muzzles of guns received more heat than the breech, and therefore the metal at that part should become hot before the latter from another cause than its reduced thickness. He thought, on motion of the gases at their release, by presenting fresh particles of the heated gas to the surfaces, more rapidly than at the breech, where it was relatively stagnant, allowed the metal to receive, near the muzzle, more actual increments of heat.

The subject was continued.

Adjourned. THOMAS D. STETSON, *Secretary.*

AMERICAN INSTITUTE POLYTECHNIC ASSOCIATION,
January 2, 1863.

The Chairman, S. D. TILLMAN, Esq., presiding.

Mr. J. H. Churchill read a paper on the artificial formation of saltpeter.

Dr. R. P. Stevens made some remarks on the newly discovered lead mines in the Shawangunk grits, Orange county, N. Y.

The history of the mine is briefly this: In grading for the New York and Erie railroad down the slope of the Shawangunk mountain, from the summit at Otisville to the level of the Delaware river, at Port Jervis, nearly midway of this descent, and opposite the village of Cuddebackville, in the Neversink valley, the workmen made discoveries of boulder lead, or masses of lead ore lying in the earth covering the slope of the mountain. Though the specimens were rich and wonderful, they excited little more attention than to amuse the curious. Some years later, in building a mountain road, the Messrs. Guamaers found other and richer specimens. Some of these were brought to this city and exhibited to mineral men. This exhibition led to an examination of the locality, which speedily resulted in the discovery of the richest lead mine yet opened in the whole range of these mountains, extending as they do from Tennessee to the North river.

You will better understand the peculiar features of this mine, after I shall give a brief geological description of the Shawangunk mountains.

These mountains stretch across the southeastern corner of our State, from near Rondout, to the New Jersey line, at Port Jervis, in a S. S. W. direction. The following great geological formations compose their bulk, first; on the east, and forming the main mass of the mountains, lie dark brown and blackish colored slates, which we should call the Taconic slates of Dr. Emmons, known in our State geological report as the Hudson river group. They are from 3,000 to 5,000 feet in thickness, and, with other members of the group, fill up all the country along the Hudson river from Newburgh to the mouth of the Rondout creek. This slate rock is destitute of minerals.

Commencing in the town of Rosendale, there rises up from the valley of the Rondout, and from beneath its bed, a white and rose tinted quartz rock, sometimes very coarse, at others fine grained, and again, in other layers, of a conglomerate character. Locally, it is known as the Esopus millstone grit. It increases in thickness, and gradually ascends, progressing southwards until, in the town of Rochester, it is from 300 to 500 feet thick, and 500 to 600 feet above the level of the valley. It maintains this height, unbroken by a fault or cross valley, to the Delaware water gap, in New Jersey. The anatomy of its layers appears to be these: *a*, conglomerate, reposing upon the block slate; *b*, coarse gray layers, succeeding; *c*, drab colored layers, often shaly in character; *c*, white sandstone; *d*, white pebbles, cemented together; *e*, white sandstone; *f*, red colored layers, sometimes shaly, more often sandstone (fossiliferous, rain drops and wave marked). At the base of the mountain are seen the limestone series, which succeed the Shawangunk, sometimes rising into hills, but usually underlaying the valleys of the Rondout and Brasherkill and Neversink rivers.

This Shawangunk grit is divided up into smaller masses, usually having well defined angles, by a system of fissures running in lines coincident with the trend of the mountain, and cutting at right angles across it. It is in these fissures that lead, copper and iron pyrites are found. Where the fissure is wide enough to hold an amount of mineral of sufficient economical value to work, there we have a mine, as at Ellenville, Wurtsboro', and the newly discovered vein of the Messrs. Guamaers. This latter is one of these fissures, from two and a half to five feet wide, filled in with clay, rubbish, or broken rock and galena. Its course is up and down the mountain, about S. 70° E., and N. 70° W. It is nearly perpendicular, and at this date a shaft has been sunk upon it about thirty feet. Uniformly it bears galena, very compact, of fine grain, and steel gray in color; bi-sulphate of copper, zinc and iron are found with it, but sparingly. Its location is about midway of the mountain, up and down, a few hundred feet from the Erie railroad, above it; and geologically, in the white and gray sandstone layers, immediately below the red layers.

The regular subject of the evening, "Implements of Modern Warfare," was then taken up.

Mr. Schoonmaker explained his conceptions of a torpedo to float at any required depth in the water of a harbor or river: the arrangement of a mirror with a gràduated line across it so as to tell by inspection when the vessel of the enemy is exactly over the torpedoes, when they are to be discharged by galvanism, with modifications for use and fall of tubes.

Prof. Seely remarked that very quick powder might attain a higher heat during an explosion of a gun than the 8,400 mentioned by Mr. Wiard, and slow powder less, according to space and previous temperature and condition of the material of the gun.

Mr. Wiard described some recent experiments as to the non-conducting peculiarity of water. He placed a vessel with copper bottom and clay sides on the top of a very hot stove, the vessel filled with lumps of ice and flooded with cold water. After the vessel had remained there one and a half hours, and after a common tin vessel of cold water had boiled, and was constantly boiling hot, in the same expôsure, he found that scarcely any

of the ice had melted. He then applied heat to the top of a vessel similarly arranged with copper top and clay sides, and filled with ice lumps and water, and found that it melted very soon; all which he explained on the principle that water is at its minimum density at 40° Fahrenheit, and that when the ice touched the bottom of the vessel on the stove it became denser and denser as it warmed towards 40°, and remained a non-conductor, the heaviest at the bottom. But when the heat was applied to the top of the ice, then it melted into water, and as this water warmed towards 40° it condensed and sank, carrying down heat to the ice below until it was all melted and raised to about 60° of temperature. He concluded that water conducted heat only by circulation, and not by transmission; hence, to melt ice, apply the heat to the top or sides of a vessel.

Field Artillery.

Mr. Norman Wiard.—The United States field artillery carriage, of the present day, of which more than twelve hundred have been ordered since the rebellion commenced, is, in most essential particulars, the French system of Gribeauval, of 1765. A slight improvement was adopted in 1827, viz., in making the trail single.

The resistless force of public opinion caused some attention to be given to rifled field guns at the beginning of the rebellion; but this was, however, mainly due to the attention given to the subject by that arch traitor, Jefferson Davis, when in the cabinet of the United States, perhaps for the purpose of entailing the expense of experiments on the government, in order to use the knowledge so obtained, at a later time, to enable him to subvert the very government affording him such facilities. But the new principle was so imperfectly applied that rifled guns came very near being discarded altogether.

The chief errors in practice, however, resulted from retaining the old standard carriages, designed for smooth bore guns; using projectiles of double the weight for the same weight of gun, for the rifle guns; in adopting calibers that were too large, and in using bronze, a material that has been found, after careful experiment, not to possess the required endurance. A six-pounder smooth bore gun was originally designed to deliver a projectile of such a size as would allow a proper number to be carried in one limber ammunition chest, and such shells burst into a sufficient number of pieces to be very destructive within moderate ranges; but when rifled guns came into service, the smallest projectile at first proposed was one weighing fourteen pounds, for the James' caliber of 3.80. This caliber was adopted, because U. S. six-pounder smooth bore damaged bronze guns could be reamed out to that uniform size, and rifled. The weight of this carriage and gun had been arranged for a projectile to weigh six pounds. When the heavier projectiles came to be fired from them, the recoil was found to be so great as not only to materially increase the labor of the gunners, and affect the precision of aim, but it had the effect to destroy the carriages. It was also found that the guns soon became enlarged in the bore, which was accounted for by the increased *strain* upon them. It was, however, chiefly due to the longer time the surface of the bore was exposed to the heat of the powder. First, the heat expanded the inner metal, dis-

tending or stretching the outside ductile metal; then, when the gun was cooled, the inner metal was distended slightly beyond its elasticity, and it was enlarged. This effect will always be more apparent in a bronze than in a wrought iron or steel gun, and it destroys a bronze rifle gun after a few rounds, and this effect is produced much sooner where the twist is very quick, as in the Dahlgren navy bronze rifle howitzers, which have one turn in five feet, or more than twice as much as is proper. After the "James' gun," the next field rifle gun officially adopted was the three inch wrought iron gun. In this model the caliber was still too large, as but forty rounds can be carried in one ammunition chest, and the gun is much too long for rapidity of working and accuracy of aim, and is too light for the weight of projectile, it having only about eighty pounds of metal in the gun for one pound of shot. The best proportion is to have the gun about 100 times as heavy as the powder and shot, and the gun and carriage about 300 times that weight. The three inch gun was mounted on the same carriage as the old six-pounder smooth bore gun, and its recoil was found to be so severe that the carriage was destroyed. Hon. P. H. Watson, the able and intelligent Assistant Secretary of War, once informed me that he had received *a great many reports of broken carriages*, and I saw about thirty broken or bent axles after the second battle of Bull Run, all of them 3-inch guns or 10-pounder Parrotts. I saw, also, at the Washington arsenal, several axles injured by proving 12 and 24-pounder James' guns on their carriages. These guns were afterward dismounted and fired while lying on the ground, when they recoiled from twenty-three to thirty-four feet. When it is considered that if the gun and shot were of the same weight, the gun would be projected as far as the shot, it will be seen how important a part "recoil" plays in the delivery of the shot, and of the accuracy and range. A gun carriage wheel does not *roll* back as far as the gun recoils; it merely slips a part of the distance, and, as the wheels are the last part of the carriage to recoil, the consequence is, many of the axles are bent, broken, or twisted out and away from their fastening under the cheeks and trail, where the fastening is insufficient, it being on the top of the axle only, which is bent or broken by the resistance to recoil by the heavy wheels.

When the rebellion was first inaugurated, the authorities of the State of New York caused all the gun carriages belonging to the State to be examined for the purpose of putting them in repair. These carriages had not been in service, but had stood unused for years in the arsenals. I was present when some of them were examined, and it was decided that all would require repairs to the wheels; many of the spokes would have to be taken out, wrapped with canvas and re-driven, and that all the tires would have to be cut, welded, and re-set. It was estimated this would cost $40 for each of the carriages belonging to the State. The wheel I have designed and adopted for all my field artillery carriages, hereinafter shown, resulted from the suggestions I received at that time.

I have, however, found it necessary to make the following improvements on my original carriages, viz:

Improved sights and means of adjusting, a number of additional spare articles for repairs, among which are two spare hubs and plates, and chains

attached to the battery wagon to carry them; also, parts of wheels, bolts, etc., an anvil block, an improved grindstone frame, and a maul.

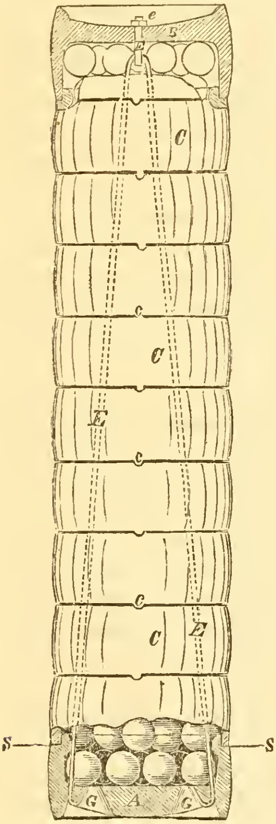
I now propose to furnish a 12-pounder howitzer in place of my original 12-pounder rifle, thus requiring but one size of carriage for my 12-pounder smooth bore and 6-pounder rifle field gun; also to fix the implements on the top of the trail, where they are not liable to be lost or injured in passing over bad roads.

An improved elevating screw adjustment, to avoid injury to the gun by pounding on the head of the screw in traveling, and to avoid the projection of the screw below the trail where it was liable to strike stumps or other obstacles when passing over newly cut roads; and relieving much of the difficulty found in moving over wet and muddy roads with the present carriages.

An improved canister, better adapted to rifled guns.

Improvements in the construction of the wheel, by which repairs are facilitated, and an improved manner of mounting the trunnions on the gun.

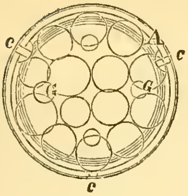
One of the objections heretofore made to rifled light artillery has been that canister could not be made effective, as the expansion of the case containing the balls filled the grooves and caused the canister and contents to revolve about its own axis as it left the muzzle of the gun, with so high a velocity, that centrifugal force scattered the shot in every direction except the one in which it was aimed; many of the shot would strike the ground immediately in front of the gun, some would be thrown to the extreme right, some to the left, and some to and beyond the object.



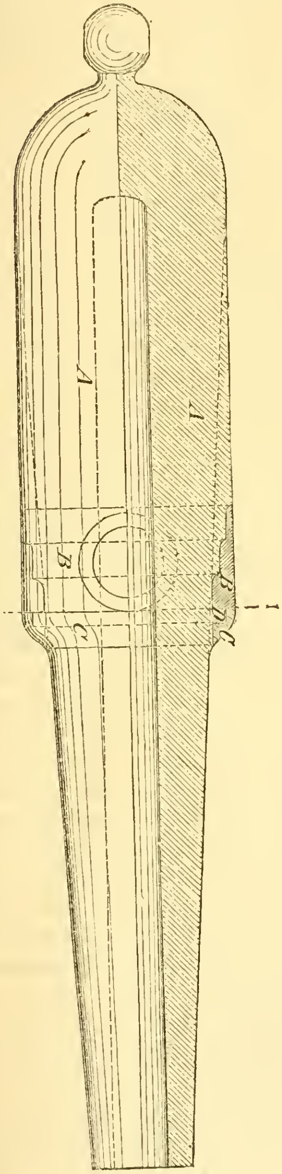
An effective canister, such as is hereinafter described, will, by its adoption into service and use, enable rifled guns to recover their deserved popularity.

The Wiard canister is specially adapted for rifled guns, but is equally effective in smooth-bore guns; it is somewhat different from the ordinary canister, having a cast iron case in sections, the main object attained being the passage of the case from the gun without expansion into the rifle grooves. Each ring or section is rounded on its edge, so as to pass over the grooves.

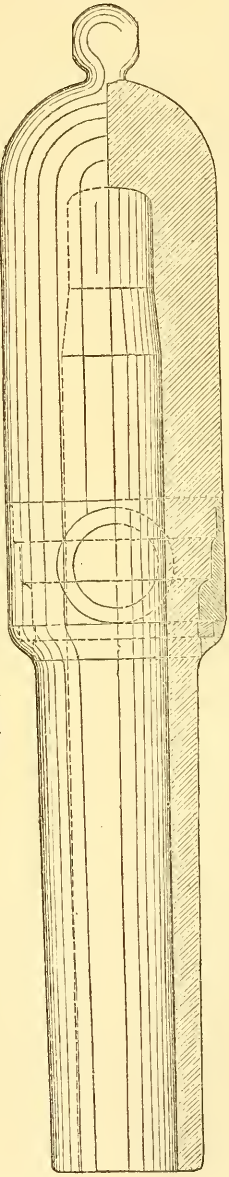
The opposite figure is a side view partly in section, and a cross section on the line *SS* of a canister constructed according to my invention. *A* and *B* are the end castings, and *CC*, etc., are intermediate castings forming a completely inclosing case for the shot *D*. A wire *E* connects the front plate *A* with the rear plate *B* through the aid of the hook bolt E^1, and tightening nut *e*. Each of the rings, or intermediate castings, *CC*, is flanged at its forward edge, and provided with three points *ccc* at its rear edge. These narrow surfaces may



be readily reduced by a file, or any other suitable tool, so as to make the form practically perfect, and insure that the canister, when tightly drawn together, shall be straight with very little labor in the fitting. When this canister is fired from a rifled gun, the castings *ABC* ride upon the lands alone, and the whole behaves exactly as if the gun were a smooth bore. The exterior of *ABC* may be finished or covered with cloth or paper to induce a gentle effect on the gun, and the number of the rings *C* interposed between *A* and *B* may be increased or diminished, according to the strength of the gun. All the castings *AB* and *CC* are rounded on their exteriors, so as to correspond in form with a portion of a sphere or spheroid. This renders it impossible for the edge of any casting to come in contact with the inner surface of the gun, and abrade it under any circumstances. *G G* are holes in the rear casting *A*, which allow the gases to enter and permeate among the balls *D*, while the canister is moving along the bore. As soon as, or before, the canister escapes from the muzzle, the hook bolt or wire breaks, and the canister is expanded lengthwise by the tension of the gas thus admitted, through the holes *GG* at the rear end, the hook bolt E^1 breaking



The 6-pounder rifled gun.

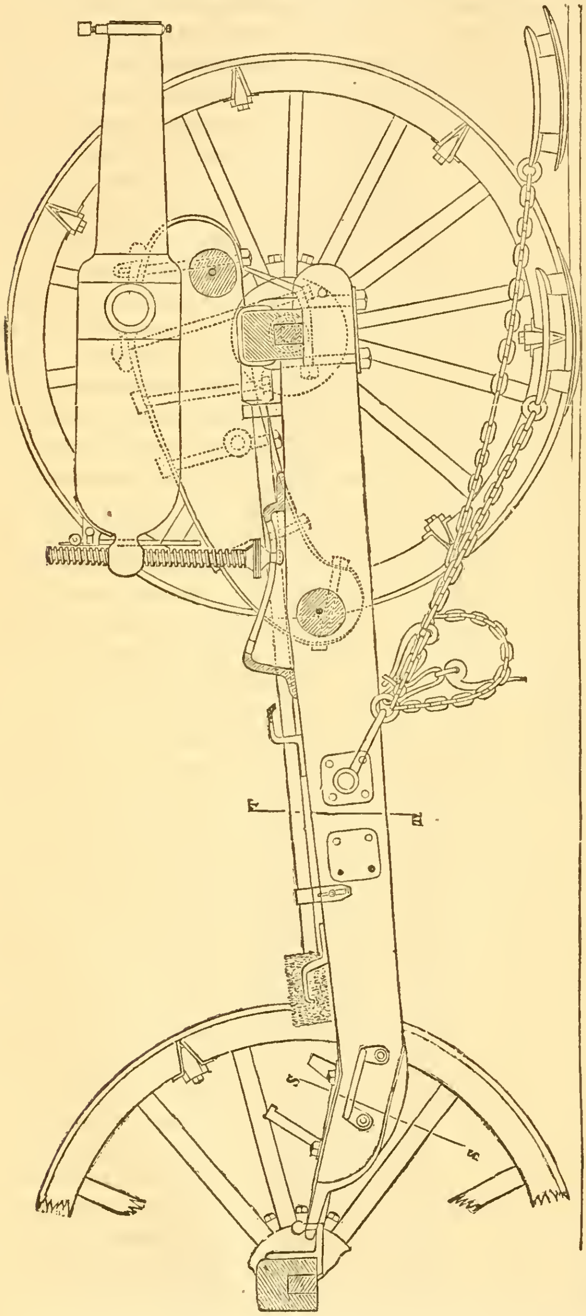


The 12-pounder smooth-bore howitzer.

easier than the castings *CC* projecting the cover *R* in advance. The same canister is also adapted to smooth bore guns.

THE CARRIAGES.

The following figure represents my field gun mounted on my carriage,



when limbered up and the locking shoe adjusted as prepared to descend a hill. This cut is a cross section on the line *SS* of the trail.

The stock is made in the form represented, and attached to the *under side* of the axle by means of the bolts connected with a strong saddle resting on the top of the axle, as shown in the figure. By this means I am enabled to give a greater degree of elevation to the piece, and, at the same time, maintain the proper strength in the carriage to sustain the recoil when fired at such high elevation, and the carriages of a battery thus constructed occupy but about two-thirds of the space occupied by the common United States carriage, when packed for transportation on cars or ships. It gives room, also, to fix sponge and rammer, as seen in the figure, on top of the trail, where they are not exposed to being torn off or broken, as if below the trail. The cheeks embrace the upper portion of axle,

and are bolted to the stock or upper end of the trail. They are also connected by a rondelle in front of the axle. The form of the cheeks is peculiar, presenting no salient angles, and so rounded as to each receive a strap extending entirely around it and the axle. By means of a nut arranged as represented, and aided by bolts and corresponding nuts, this strap may be taken up, as the wood which it incloses shrinks, and may be caused to maintain a tight condition upon the cheeks at all times.

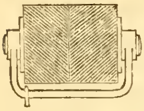
It was at first objected that the trail of my carriage was too low, and liable to come in contact with stumps or obstructions on bad roads; this objection did hold to some extent as against the 12-pounder carriage which I at first offered, but it will be observed, by examining the carriage "limbered up," that the forward end of the trail is nearest the ground, and at that point it is higher than that of any standard United States field carriage. In addition, I have now placed the implements on the top of the trail, while in the standard carriage they are below, giving this carriage an advantage on that account. In this carriage the elevating screw never projects below the trail to strike an obstruction—another advantage.

In gun carriages, as ordinarily constructed, the violent recoil of the gun tends to twist off the fastenings, which are all on the top of the axle, by which the axis is secured. In this construction, there is no such tendency.

The trail is of the usual form, except where it rests upon the ground. The ordinary trail is rounded at this latter point, so as to form a portion of a cylinder, with the axis at right angles to the plane of the trail. Such form allowed only a small surface of the trail to rest upon the ground, and the pressure thereon at the instant of recoil was so great as to cause it to dig into the ground and partially bury itself therein. While this action diminished the amount of the recoil, and was so far an advantage, it so altered the condition of the ground on which it rested and moved that another shot could not be fired from the same position, without a readjustment of the elevation of the gun, and also of the trail, which would sometimes slip, after the gun was carefully sighted. In this improved carriage I form a plane surface under the trail, where it rests upon the ground, which surface is gradually rounded into the inclined surface of the trail, as shown. This plane portion presents so broad a surface to the ground on which it rests as to prevent the trail from digging a hole in the ground, and to avoid the consequent necessity of a frequent change in the position of the carriage, or a corresponding change in the elevation of the gun, relatively to the carriage. This feature is of great importance in carriages constructed to admit of so great an elevation as my improved form, for the strain on the carriage is greatly increased at such elevations, and would be liable to break the carriage, unless it were at liberty to recoil readily. And if the trail was so pressed into the earth as to seriously retard the recoil, the liability of damage to the carriage would be greatly increased.

To the flat surface I affix a flange or keel, as shown by the small cross section. This is a narrow and sharp piece of metal, adapted to cut into the earth and act as a keel to cause the recoil to be in a straight line; if there is an obstruction behind one wheel the shot may be diverted slightly by the slewing of the carriage.

In transporting guns, when descending declivities, it is necessary to lock the wheels. This has heretofore usually been done by locking a wheel, which could be done on one side only, by means of a chain attached to the trail. This method tends to rapidly wear out the tire of one wheel, and requires that the carriage be stopped long enough to lock and again to unlock the wheel, which in rapid movements is sometimes a serious matter, and if a whole column were delayed the evil might be disastrous. I employ a shoe, so peculiarly constructed and attached that it may be dropped in front of either wheel at pleasure, and the wheel caused to run upon it, and to ride down the declivity upon the shoe, and then the latter may be



again released from the wheel without stopping the carriage at all. The left figure is a cross section on the line *TT* of the trail, and the right figure is a plan view of the shoe and its connection.

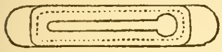
The shoe is made to fit the periphery of either of the wheels. To ears on one side a traverse is fixed, as represented, carrying a ring which is free to slide to either end of the shoe, whereby the shoe is adapted for use under either wheel at pleasure, by simply shifting ends. A chain extends from the ring to a traverse hung beneath the trail, as represented in the right hand cross section of the trail above; this chain being of just sufficient length to allow the shoe to pass under the center of the wheel. The traverse under the trail and the one on the shoe allow the chain and shoe to extend to either wheel as desired, as shown.

In the chain I make one of the links longer than the rest, and provide a slip-link and ring, so arranged that by sliding the ring off the end of the chain it will be parted, as is obvious from the drawing. Another chain is attached to the two parts in the manner represented, and is of such length that when the toggle is parted by means of the slip-link, the combined length of the two chains is sufficient to allow the wheel to roll off the shoe, which shoe still remains attached to the carriage by means of the united chains. When the shoe is not in use, the slip-link is fastened by the ring, and the shoe hung upon a hook attached to one of the cheeks. When it is desired to lock one of the wheels for the purpose before indicated, the shoe is taken from the hook and dropped in such a position that one of the wheels will run upon, or rather into it. As soon as the chain becomes tight, the shoe is dragged along thereby, and the wheel rides upon it and ceases to rotate. When it is desired to release the wheel, the ring is slipped off the end of the toggle and the wheel rolls off, to run again upon the ground in the ordinary manner; the shoe, being trailed along freely behind by the chains, may then be taken up and hung again upon the hook; and the slip-link may be again set as before, so that the parts shall be ready for use, without delay, when occasion shall again require.

The condition of the parts, when the ring is slipped off the toggle, is indicated by dotted outlines in figure of the carriage.

In constructing the guns, the trunnions are attached to a band which is shrunk on to the body of the gun, a section of which, showing the seat of steps, is indicated on the drawings of the gun, so that the body of the gun may be hammered uniformly in forging. The elevating screw passes

through the knob of the cascabel, like the screw on the naval boat-howitzer, and in dismounting the gun it is necessary to depress the muzzle until the foot of the screw slides back to the enlargement of the slot, shown on this



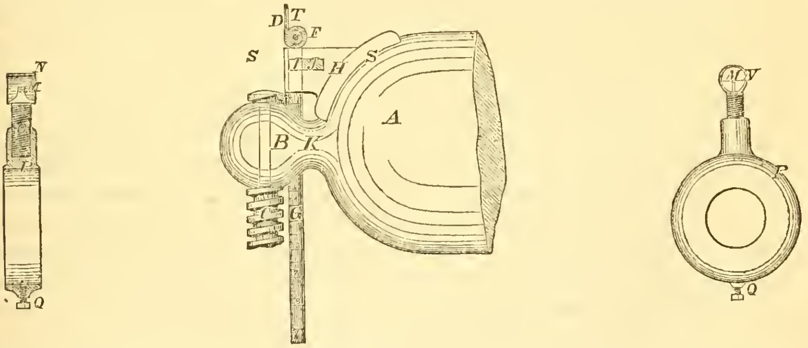
plan view of the piece bolted on the top of the trail, into which the foot of the elevating screw works, and during which it moves as the gun is elevated or depressed, until the button on the bottom end will rise through the enlargement of the slot. Either gun can be mounted on the same carriage, and can be elevated 35° for any service requiring it. Each gun weighs 725 pounds. The gun and carriage weigh 1,850 pounds, and the recoil is but twenty inches.

By the great elevation that can be attained on the guns, shot can be projected along a high trajectory, falling nearly perpendicularly. With one ounce of powder in the rifled gun with 35° elevation, the range is 800 yards; with two ounces, 1,200 yards. Fuse shells can thus be dropped into otherwise inaccessible places—inside earth-works or forts—or shot can be projected over a mountain with either gun, so elevated, and take effect in a valley beyond. With a full charge of powder at this elevation, a shell can be projected more than four miles, to burn barracks or buildings, bridges, etc., or to annoy an enemy. The range of shell from the smooth-bore gun is also considerable, with the great elevation at which, if necessary, it can be used. The guns are no less effective at short range from these modifications.

The slotted and curved piece which supports the elevating screw allows it to be tapped through the cascabel of the gun, so as to prevent the gun from jolting and hammering upon the elevating screw.

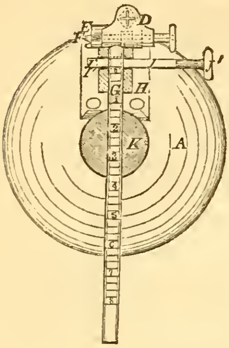
THE SIGHTS.

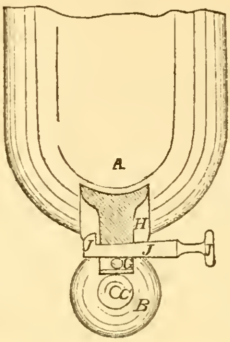
The cuts exhibit the sights employed to facilitate the directing of the gun, and may be applied to both forms of the guns. The side figures are a



front view and a cross section of the front sight, and mode of mounting the same. The middle figure is a side elevation of a portion of a gun with sights. *A* is the breech and *B* the cascabel of the gun. *C* is the elevating screw, and *D* is a rear sight, which is mounted in ways *E*, to be traversed right and left by turning the screw *F*. The ways *E* and their attachments are supported by a rod *G*, which is adapted to slide vertically through the neck *K*. *H* is a piece of metal fixed upon the breech *A*, at the point represented, and provided with a hole, exactly in line with the hole in the

neck K of the cascabel, so as to allow the vertical rod G, which supports the sight, to slide up and down therein. I is a horizontal slot formed therein, and J is a wedge provided with a stop j, and a suitable knob or handle J^1. This wedge is adapted to release or tightly to confine the vertical rod G, according as it is moved from the right to the left; and in case it should, by any accident, be lost or deranged, a piece of tapering metal, or wood of any kind, may be temporarily inserted to supply its place. This is important, because the usual way of fastening with thumb-screw runs the risk of the thread being stripped, and in such case a thumb-screw is not easily replaced. The vertical rod G is graduated so as to indicate the elevations of sight in seconds and parts of seconds, and thus to indicate the time in seconds which a projectile will fly at that elevation, and descend to the line of sight. My graduations are adapted for service charges, and when less or more powder is used, or slower or quicker burning powder is employed, allowance must be made therefor; but with service charges of the proper powder the graduations may be relied upon as giving, very accurately, the elevation required for the rear sight in order to hit the object aimed at, provided the time of the flight of the projectile is determined with accuracy. By this method, the operation of adjusting the sights and the fuses, so as to explode shells at given varying points, is very much simplified. The wedge J and its connections allow the sight to be adjusted very delicately, and to be secured firmly and quickly. For higher elevations than the light rod G admits, wooden sights are supplied, as shown, which are inserted in the elevating screw, which latter is hollow in the line of its axis; the wooden rods being nicely fitted, will be held in their respective positions by friction.



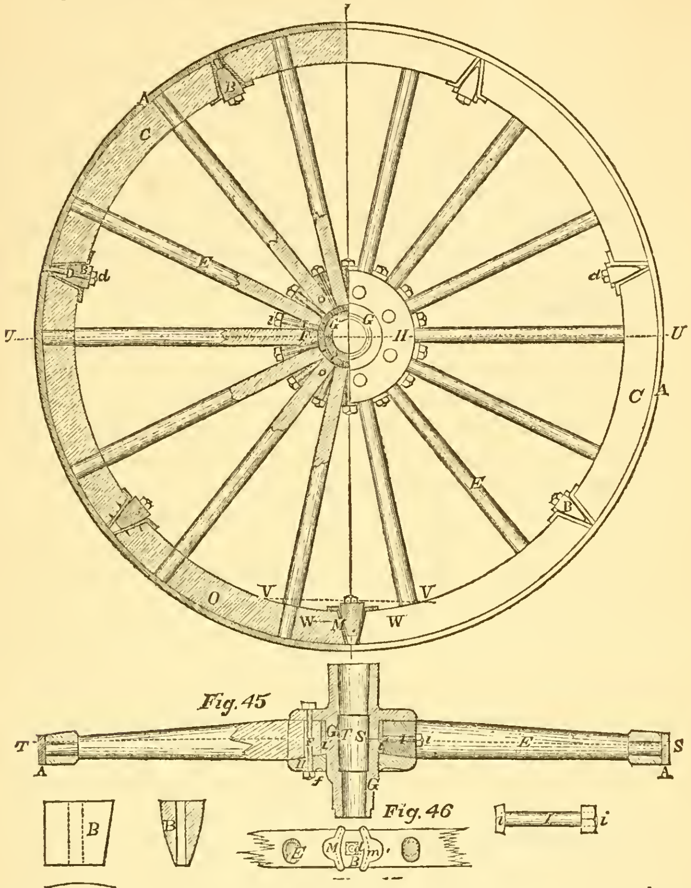


The front sights are denoted by M; they are shielded by a small ring N, as represented, and are mounted by a very finely threaded screw O, on a thin ring P. This ring may be applied and removed from the muzzle of the gun by turning the set screw Q, and it may be applied very accurately to the muzzle of the gun, by the use of proper marks on each. This insures that the front sights shall be always correctly in line. The ring P with its attachments may be removed with great facility in case a gun is likely to be lost, and be again quickly applied if the gun is retaken.

THE WHEELS.

The purpose of this portion of my plan has been, to provide for the shrinking of the wood and the stretching of the tire, by changing the position of the parts of the wheel, so as to maintain a firm and rigid wheel under all conditions; and, also, to allow of the easy removal and replacing of all parts of a wheel without delay, and without removing the wheels from the carriage.

The shrinkage of the material, and the consequent shaky condition of ordinary wheels exposed to a very dry atmosphere, are too well known to require elaborate remark, and the desirability of completely repairing a wheel damaged by a shot, or otherwise, without delay, is obvious.



Certain parts of the wheels of gun carriages are frequently entirely destroyed by a shot from the enemy, while other parts are unaffected. By simply moving the carriage so much as will partially revolve the wheel and bring the injured part on the upper side, if it is not already there, I can, with the aid of a suitable wrench, remove the injured parts of my wheels and insert new parts, which, after a proper setting up of the bolts, make the wheel as complete as before. I have recently demonstrated, in a practical test before United States officers, that I can singly repair the wheels of artillery carriages, constructed according to my invention, faster than a man with an axe can destroy them.

The figure represents a side elevation and cross section of a wheel, constructed according to this portion of my invention. Figure 45 is a cross section of the wheel in the line *UU* in figure 44. Figure 46 is a plan view of a portion, or more exactly a cross section, on the line *VV* in figure 44. Figure 47 is a cross section on the line *WW* in figure 44.

A is the tire. It has seven holes properly countersunk to receive the conical heads of an equal number of tire-bolts, which pass through peculiar wedges *B* at the ends or joints of the seven felloes *C*. These tire-bolts are designated by *D*, and the nuts which are fitted thereon by *d*.

These parts constitute the rim of my wheel. The wooden felloes *C* are forced apart and stiffly maintained in position by the rim wedges *B*, acted on by the bolts *D* and nuts *d*. As the tire *A* becomes gradually stretched by use on a hard road, the wedges *B* must be all operated outward to keep the parts in tight contact; and when the tire *A* is removed to be contracted by the blacksmith in the usual manner, it may be contracted more than with ordinary wheels, and by letting the wedges *B* back or inward, by slackening the nuts *d*, the wheel will be diminished to its minimum size, provided, always, that the spokes are correspondingly allowed to contract by the operation to be described below, so as to maintain the proper relations of the parts of the entire wheel.

MM are malleable iron castings, secured upon the ends of the felloes by screws or nails as represented. They are made in the form represented, and provided at each edge with a flange *mm*, embracing the wood *B* at the end of the felloe. This prevents the wood from splitting, and prevents the wedge from working itself into the wood, or in any manner distorting the same. A flange or lip m^1 is also provided, which rests against the inner periphery of the felloe, and prevents the castings from being displaced radially. The wedges *B* are rounded both longitudinally and laterally as represented. The castings *M* are rounded to correspond with the lateral curvature, or the curvature exhibited in figures 46 and 47, and are not rounded in the radial direction, being straight in that direction, as previously shown.

The spokes are designated by E. There are two spokes inserted in each felloe in the manner represented. The inner end of each spoke *E* is tapered as shown, and each alternate one is perforated by a bolt *F*. These bolts are fitted with nuts *f*, and by operating the latter, the hub is contracted in the direction of its length. The figures show the construction of the hub, and the manner in which the heads and nuts of these bolts apply to the exterior thereof, to compress the same upon the tapering or wedge-formed ends of the spokes *E*. It will be observed that the hub is in two parts, *G* and *H*. The part *G* includes the whole bearing upon the axle. The part *H* is a ring capable of sliding to a sufficient extent thereon to compensate for any shrinkage and radial motion of the spokes; long holes or slots are provided in the spokes *E* as represented, to carry the bolts *F* so as to allow a radial motion of the spokes.

The inner ends of the spokes *E* abut against the heads i^1 of bolts *I*, which are inserted through wedges *J* and operated by nuts *i*. These hub wedges *J* fill the spaces between the spokes as shown, and complete the hub of the wheel. When the wheel is new the heads *i* of the radial bolts *I*, rest against the casting *G* as indicated. When from an enlargement of the tire by use, or from any other cause, it is desired to slightly enlarge the wheel by moving the spokes radially outward within the hub *G H*, the bolts *F* and *I* must be first slackened by loosening the nuts *f* and *i*. The rim wedges *B* may then be operated to expand the rim in the manner above

described, until the felloes bear firmly against the tire. The bolts *F* and *I* are then again set up tight by turning the nuts *f* and *i*. The nuts *f* will return to their original positions and a little beyond that, because the radial movements of the spokes *E*, by withdrawing their wedge-like ends a little, will allow the part *H* to slide a little further upon the part *G* of the hub.

It will be observed that the form of the wedge *B* is such as guards the ends of the two adjacent felloes from getting out of line.

By the construction herein described, I am able to compensate for the enlargement of the tire and the shrinkage of the wood, and to readily make the proper substitution when a part is injured.

This removal and substitution of parts may be done on the field, while an action is progressing, and it is of very great importance, as it may very often be the means of maintaining a gun in a serviceable condition which would otherwise be useless, and, in other cases, may render it practicable to retreat with a gun, which, in the absence of this invention, would be lost.

On motion, the subject was continued.

Enos Stevens, *Secretary pro tem.*

American Institute Polytechnic Association,
January 9, 1863.

The Chairman, S. D. Tillman, Esq., presiding.

The preliminary hour of the Association was occupied as follows:

Mr. Hoard exhibited a model illustrating the movements of a hydrostatic engine, which, on motion, was referred to a committee consisting of Messrs. Seely, Fisher and Bartlett for examination.

Mr. Wiard exhibited apparatus for heating water, which elicited discussion.

Dr. John B. Rich stated that Mr. Joseph Dixon, of Jersey City, a member of the standing committee of manufactures, science and arts of the American Institute, had constructed a musical instrument, on which much labor and expense had been bestowed, and suggested that it might not be inappropriate for a committee to be appointed to examine the same.

Whereupon, on motion of Mr. Bull, the Chairman appointed a committee consisting of Messrs. Rich, Bull and Rowell, to report thereon.

Inland Navigation.

In October, the attention of the Polytechnic Association was called to the subject of canal lock gates by Major R. Taylor, who presented models, and explained their operation apparently to the satisfaction of the Association, when an evening was set apart for the discussion of the subject of inland navigation, on which occasion Major R. Taylor read a paper on canals, of which the following is a synopsis:

He said his attention had been called to the subject in consequence of having been interested in an improvement for operating the gates of locks,

which led him to reflect still further, resulting in an improved plan of gates, which he desired to have tested by the State, and thought the attention of those interested in the success of our canals might be sufficiently awakened through the voice of the Institute to cause it the more rapidly to be brought into notice. His mind, also, was so occupied with canal matters, that it led him to examine into their history. It appeared, from all the information that could be gathered, that all countries have, at an early period in their progress, considered the matter of so much importance, that it was one of their chief objects to render internal communication by water as general as possible.

Long before the Christian era canals existed in Egypt, originally for purposes of irrigation, and subsequently for the passage of boats. The importance of canals was early appreciated by the Chinese, with whom a complete system of them has long been in operation. Unacquainted with locks, they, and European nations as well, used inclined planes to raise or lower their boats from one level to the other, by means of the capstan.

In the twelfth century canals were introduced into the Netherlands. Their adaptation to the flat country of Holland caused them to be rapidly extended through that country until they connected nearly all their villages, and were used as the principal means of communication.

Canals were not, however, introduced into European countries generally until the invention of locks occurred, which was in the fourteenth century. From that period to the present all countries have paid particular attention to creating a system of inland, or inter-water communication, which embraces various modes, either by canal, lake or river, or all combined, as we have it in this State. The system of inland navigation is, perhaps, as well developed in this as in any State or country of the world, yet it is not what it should be, by any means.

Previous to the introduction of railways into England there had been made over two thousand miles of canal, besides slack-water navigation. Canals were first introduced into this country by Massachusetts, in 1792. In 1795 the James river and Kanawha canal was projected by General Washington. The object of this canal was to connect Richmond with the great northwest, which the statesmen of that day clearly saw would be *the* great agricultural region of this continent.

A canal was commenced on a small scale and extended for a few miles only. It has undergone several enlargements, and now reaches Covington, some 200 miles from Richmond. Whether the dream of the projectors of this canal will ever be realized, it is now impossible to tell, but if, in the mutations of time, Virginia shall be regenerated, it is not improbable. Nearly every State of the Union has built canals to connect the rivers or lakes within their borders, in order to expedite transit, or render parts heretofore shut out, more accessible to and from the seaboard.

It was left for the State of New York, however, to perfect the most important chain of inland navigation ever known. Not that the Erie was the longest or largest canal that had been built, but the conception and completion of it in so brief a period, and the evidence of its success being witnessed by its projectors, makes it the grandest work of modern times.

Witnessing the progress this State was making, Pennsylvania undertook

a course of internal improvement, and her greatest work was a canal extending from Philadelphia to Pittsburg, a distance of about 400 miles. This and other projected canals were finished, and after a number of years of varied success they were sold to private companies, which now control them.

Thirty years' trial proved the Erie Canal a success; and while it answered the purpose of its projectors, its capacity was not adequate to the demands that were being made upon it, therefore an enlargement was determined upon, and in 1862, the first year of its completion, the receipt of five million dollars demonstrated that its enlargement was not completed any too soon, and that its capacity should have been as large again as that determined on, for already thousands are clamorous for its further enlargement. To meet the demands upon its capacity, Major Taylor has invented a plan of gates which, by their adjustment to the *present* locks, will give a length of chamber of 140 or 150 feet.

Such an improvement could be immediately availed of, that is, they could be adjusted to all the locks on the Erie and Oswego canals in one winter season of suspended navigation. Such an alteration would accommodate the business of the canal for several years to come; at any rate until either the canal could be enlarged to double its present capacity, or a new canal be made on another route, which Major Taylor thinks is practicable from the Erie canal, at Macedon, to Seneca lake, at Geneva, using Seneca lake to its head, thence to Owego on the Susquehanna river, which river could be made navigable to Great Bend, thence by a new canal to Stockport, on the Delaware river, using the Delaware, when practicable, and a canal on its bank, and also a canal from Port Jervis to the Hudson, at Haverstraw.

The Susquehanna, at Owego, is 382 feet above the level of Seneca lake, between which points the distance is some forty miles. From Great Bend, on the Susquehanna, to Owego, the river has a gradual fall of less than 100 feet in a distance of seventy miles, showing that it can easily be used by means of dams and locks. From Stockport to Port Jervis, the Delaware descends some 400 feet in a distance of seventy-five miles. This could easily be overcome by a canal on its banks. From Port Jervis to the Hudson, at Haverstraw, the descent is 450 feet. At Haverstraw the land for a mile or more on the bank is quite level, and is only about ten feet above the level of the river.

A plane extends back from Haverstraw a number of miles towards Port Jervis. Several things can be mentioned in favor of such a route for a canal. There is plenty of water. It would be nearly one hundred miles nearer than by the old Erie, and the overslaugh, near Albany, would be escaped.

Major Taylor gave the quantity of grain that had been received at Chicago ending with the year. It was something like 58 million bushels; also, the tonnage of the boats employed on the canal, which was about 500,000 tons—the number of boats at about 4,000; the speed of the boats as $1\frac{1}{2}$ miles the hour, and the average passage as 14 days from Buffalo to Albany. He also gave the length of the boats as 98 feet and their width 17 feet, and that the largest of the recently built boats could carry about

6,500 bushels. The whole of the paper of Major Taylor was entertaining, and showed that he had really given much time to a subject which, for importance, has no equal in this country.

The subject of "Locks" was selected for the next evening's discussion.

On motion, adjourned.

JIREH BULL, *Secretary pro tem.*

AMERICAN INSTITUTE POLYTECHNIC ASSOCIATION, *January* 16, 1863.

The Chairman, S. D. TILLMAN, Esq., presiding.

There being no preliminary business, the regular subject of the evening was taken up.

LOCKS.

Mr. Bull.—Mr. Chairman, I proposed this subject of locks with a view of getting some information on the subject from a gentleman of the very highest eminence in this department. I have the honor of introducing to the meeting Mr. Hobbs.

The Chairman.—Mr. Hobbs will have the floor.

Mr. Hobbs.—I came here, Mr. Chairman, with the expectation of participating in a discussion on the subject of locks, and not with a view of delivering a discourse on it.

Mr. Bull.—I hope Mr. Hobbs will favor us with some remarks on the subject.

Mr. Hobbs.—Without models or drawings, Mr. Chairman, it will be impossible to explain the details of construction; I will, therefore, confine myself to the general principles of security against picking. All locks may be divided into two classes. The first class is that of locks with wards, in which fixed obstructions are secured in the box or about the key-hole, to prevent the key from turning unless openings are cut out from the bit to correspond with the wards. These locks have been made in great variety, and the wards have been fashioned in very ingenious forms to make it difficult to fit keys to them. But the difficulties are easily overcome by introducing a blank key with a coating of wax and turning it against the wards, which impress their positions and forms upon the wax. A skeleton key is then made, not to fit all of the wards, but simply with the bit constructed to pass them, by which means the lock can be opened. This class of locks has been abandoned where great security is required.

In the other class of locks the obstructions to the motion of the bolt are movable. These movable obstructions are usually called tumblers, but why they should receive this name I do not know; they certainly do not tumble. But whether tumblers, latches, pins, slides or wheels, these locks belong properly all to the same class, though they have been made in endless variety. In the most simple the tumblers or latches must be raised high enough, and no harm is done if they are raised higher; but a more difficult lock to pick is that in which, if the tumblers are raised too high, their hold

upon the bolt is renewed. In another variety of this class the tumblers move partly in one direction and partly in the other.

The senses that can be made available in lock-picking are seeing, hearing and feeling, and all the devices which have been invented for increasing the security of locks have been intended to baffle these senses. All locks constructed up to a certain period can be opened by feeling the pressure imparted to the obstructions by the effort to withdraw the bolt, or by tracing the impression left by the key along the bellies of the tumblers. But these operations were prevented by constructing locks without key-holes; the obstructions being adjusted by means of a dial and index on the outside, or by having the keyhole entirely closed during the movement of the bolt, so that the pressure on the obstructions could not be detected by feeling. These varieties of locks have been opened by measuring the motion of the bolt by means of a micrometer. Micrometers are made to multiply 20,000 times; so that if the bolt moves a distance equal to the thickness of a sheet of tissue paper, the instrument indicates a thickness of 20,000 sheets.

In order to make a secure lock it is necessary to know all of the methods of picking. As soon as lock-makers discover any new method of picking, new devices are introduced to guard against it. The locksmiths thus far have kept far in advance of the burglars in the knowledge of lock-picking; no burglar ever having picked the best lock of the time.

The ward lock is very ancient; I have seen those that were taken from the ruins of Herculaneum and Pompeii, and they were in common use among the Romans. The first lock with movable obstructions was Egyptian. There is one in use in Egypt now, which is a very good lock. The bolt is furnished with pins, and the key has pins to correspond, and if the pins are pushed too far into the bolt, those in the key enter the holes and stop the movement of the bolt.

Mr. Butler.—The Egyptian locks are made of wood, are they not?

Mr. Hobbs.—Generally of wood, though I have seen them of iron.

The great excitement at the exhibition of 1851 was caused by the picking of the Bramah lock. As I was walking down Piccadilly I saw a sign in a window which I read as a very fair challenge to pick the lock. I went in and asked the attendant if they would really give 200 guineas to any one who would pick that lock. He replied:

"Can't you read?"

"Yes," said I, "I can read, but I do not believe everything that I read."

I asked him if he would allow me to look at that lock, and he handed it down. I took out my knife and began to feel of the slides, when he interrupted me with the remark:

"If you want to try to pick the lock you can have a chance at it in a room with our foreman, but you can't be fooling with it here."

Then a gentleman came forward, and asked me if I was a lockmaker. I told him that I was not, and asked him if they really meant to offer the reward of 200 guineas, according to their placard. He said that they did, when I remarked that I should like to have a chance to try it. He said:

"Perhaps you did not observe the terms of the card."

I then examined it more closely, and it read thus: "The artist who will

produce an instrument that will pick this lock, shall receive 200 guineas reward the instant that it is produced"

I remarked, "I certainly did not observe the terms of your challenge; I supposed that it meant something, but I see that it does not. The public suppose that you offer to give 200 guineas to any one who will pick that lock. Now, you will either have to say that, or I will make you take down that sign."

It so happened that on the following day the London *Times* had an article describing a case of jewels belonging to Hope, the banker, and in the course of the article it was stated that the case was secured with one of Chubb's locks; the remark being added, "If we understand the matter rightly, an American gentleman throws down the gauntlet and offers to pick both Chubb's and Bramah's." This questioning the security of the locks was too much for both, and Chubb and Bramah each published a letter in reply; Bramah's letter closing thus: "If the American gentleman or any other person will pick our lock he shall receive the 200 guineas reward."

With a paper in my hand containing this statement, I called at Bramah's establishment and demanded an opportunity to test their lock, and, to avoid all disputes, suggested the appointment of arbitrators, to make arrangements and decide upon the fairness of the test. This proposition was acceded to by them, and Messrs. John Rennie, Dr. Black and Prof. Cowper were appointed. The lock offered for testing was a large padlock with eighteen slides, the keyhole being five-eighths of an inch in diameter, and the drill pin one-fourth of an inch. Thus the space around the drill pin was only three-sixteenths of an inch in width, and was divided into eighteen sections, allowing very delicate instruments only to be introduced. In their ordinary locks, the spring to press the sides up is of a strength of from one to three pounds, but in that lock it was of a strength of fourteen pounds, and the great difficulty was in getting instruments small enough to enter the space, and, at the same time, sufficiently strong to overcome the pressure of this spring. It took me fifty-six hours to prepare the instruments and open the lock, after which I locked and unlocked it three times in one hour, in presence of the arbitrators. After the lock was opened, the owners fell back on their original challenge, saying that the offer was for any instrument that would open it, and I had used instruments. But the arbitrators decided that I had complied with the terms made with me, and that the money must be paid. It was accordingly paid, and I, perhaps foolishly, took the gold down to the Crystal Palace and put it into my case. In all the articles that were published on the subject, there was only one that scratched me. The *Chronicle* remarked that Mr. Hobbs had opened the Bramah lock and received the 200 guineas, and, with a true Barnum touch, had exhibited the gold.

In England, as well as in this country, all sorts of people—lawyers, doctors and merchants—are constantly inventing unpickable locks. When I was there I received one day a letter from Mr. William Brown, of the firm of Brown Brothers & Co., requesting me to call upon him. I went quite elated, thinking that I was going to sell the firm a lock. After talking awhile, Mr. Brown told me that he had invented a lock, which he proceeded

to describe to me, and then asked my opinion of it. I told him that I could not judge of it without seeing either a model or drawings. He asked me directly if I could pick it, and I did not say that I could, although I was satisfied from his description that it could be easily opened. Some time afterward I saw a report of a meeting of the Liverpool Archæological Society, at which Mr. William Brown read a paper on locks. The paper was mostly occupied with an account of his own lock, and in it he said that he had explained the lock to Mr. Hobbs and asked him if he could pick it, and he did not say that he could. From this Mr. Brown argued that it could not be picked. Not long afterward I went to Liverpool and called on Mr Brown.

"Ah, Mr. Hobbs," he said, "you are the very man I want to see. I have had a new safe made and have had one of my locks put on to it. I want to show it to you."

It was a dial lock, with a wrench to throw forward the bolt. Said Mr. Brown:

"What do you think of it; can it be picked?"

"I do not know," I said, "whether it can or not. I suppose you do not consider this wrench is anything?"

"Oh no," said Mr. Brown, "anybody can get that."

"Well, if I was going to try to pick the lock, I should put on the wrench in this way, and attempt to move the bolt. Then I should feel of these dials with the other hand."

Presently the bolt moved a little way.

"Ah," said Mr. Brown, "you are no nearer to it now than you were in the beginning. That is the very thing about this lock."

"Yes," said I, "I understand; the wheels have false notches."

I kept him engaged in conversation, telling him how I should try to pick the lock, and he explaining that it could not be picked. Presently his cashier came and told him that a gentleman wanted to see him; and, just as he turned to leave, the bolts flew back. He turned round at the noise, and I quietly remarked to him that he had better lock his safe before he left, as I did not like to be left with so much money before me. The whole affair occupied less than ten minutes.

Mr. Butler.—The object of making locks like that, without a keyhole, is to prevent them from being blown up with gunpowder.

Mr. Fisher.—When gunpowder is used, is the safe generally destroyed, or is the lock merely blown open?

Mr. Butler.—The door is very apt to be blown off. I remember one case up the North river, where a lumber yard was robbed. The safe was taken from the office and blown up, and a large fragment of the door was found on the top of one of the piles of boards.

Mr. Stetson.—Do the burglars usually succeed in getting the treasure without interruption when they blow up a safe?

Mr. Butler.—They usually smother the noise by covering the safe with cloth. They then secrete themselves till they are certain that no alarm has been given, when they return and take the treasure.

Mr. Bull.—What has become of the lock that was offered here to be picked some weeks ago?

Mr. McWilliams.—I have more orders for my locks than I can fill, and am busy enlarging my works, but as soon as I get time, I intend to bring the lock here and offer it for trial.

Mr. Bull.—I should like Mr. Hobbs' opinion of that lock, for if it cannot be picked I should like one on my front door.

Mr. Hobbs.—That is a tumbler lock with false notches in the tumblers, and possesses the same amount of security as all locks of similar construction. To pretend that such a lock is unpickable is simply ridiculous. I have no doubt, however, that any well-constructed lock with four or more notched tumblers is sufficiently secure for any street door.

Adjourned. THOMAS D. STETSON, *Secretary.*

AMERICAN INSTITUTE POLYTECHNIC ASSOCIATION,
February 6, 1863.

The Chairman, S. D. TILLMAN, Esq., presiding.

There being no miscellaneous business, the regular subject, "Heat," was considered.

The Chairman remarked that there was a very general but erroneous opinion prevalent, with regard to what are called conductors and non-conductors of heat. The latter term should not be used. All kinds of ponderable matter will absorb, conduct and radiate heat. Solids are better conductors of heat than gases. These may be classified as slow and rapid conductors. The late fire at the Cherry street bakery, in this city, illustrated what disastrous consequences may follow as the effect of slow conductors. It was supposed that masses of brick work of immense thickness would completely protect the wood work in contact with its outer surface. But if the fire within is kept up without intermission for several weeks, the whole mass becomes thoroughly heated, and the outside sufficiently so to set fire to dry wood. There should always be constructed, in the outside portions of the brick work, open spaces through which air, a still slower conductor, can circulate.

Mr. Dibben remarked that he had long ago predicted that, with the present fashion of building and driving cracker bakeries, they would all be burned once a year on the average. He objected to the use of the term "latent heat," as many persons are thereby led to consider it as lost heat; while, on the contrary, no heat is ever lost, although it might remain apparently but slightly efficient. The force of heat may take another form, for light, heat, electricity and magnetism are all convertible forces.

Mr. G. Bartlett directed the attention of the meeting to another branch of the subject, the amount of heat generated by burning gunpowder. He gave some of the data necessary for computing the effective force. A few particles of the powder must be consumed, to warm the mass to be burned to at least six hundred degrees; another portion is required to bring the solids into the gaseous state. He then proceeded to show there were several other elements to be included in arriving at a correct conclusion, and, as these elements had not been definitely estimated, we must conclude

that the formala, representing the exact amount of force remaining, cannot be given.

Mr. Wiard read a paper in which he showed that the amount of force required to condense a given volume of gases, is the amount of heat force employed in the discharge of a gun. Part of this amount is expended in heating the gun, part in vent and windage, while a large portion of heat remained in gases as they escape from the gun at its discharge.

Mr. Fisher directed attention to the effect of combined oxygen in a solid state in combustibles. On comparing the amount of heat generated by different kinds of coals, it is apparent that the presence of oxygen is not advantageous, but that practically the amount of heat generated is in direct proportion to the carbon and hydrogen in the coals; and as these combine with oxygen of the air to produce heat, those portions previously combined with oxygen, and existing in the solid state, must be regarded as having already undergone the process of combustion.

Mr. Rowell explained some experiments he was making to generate steam by placing the stove or generator of heat under water, with a hot blast to supply the fire with oxygen, and also to force the hot gaseous products of combustion through water, so as to save all the heat which is commonly wasted through a chimney.

The Cause of Heat.

The Chairman remarked that we had often discussed the effects of heat and the best manner of applying it in various branches of the arts, and it would not be improper to turn our attention to the nature of heat. Up to a late date heat had been regarded as an attenuated kind of matter, which passed freely into and out of all ponderable bodies. This supposition was strengthened by a corresponding view of light. The Dutch philosopher, Huygens, boldly took ground against the opinions of Newton and his compeers, and asserted that light was the effect of the vibratory motion of an extremely attenuated and subtle fluid which pervaded all space and permeated all matter. The manner in which this motion was performed was still a mystery. There were certain phenomena which could not be explained by Huygens' theory; among these was that of double refraction. By the splendid discoveries of Fresnal of France, who demonstrated that the undulations producing light were transverse to the line of the ray, a satisfactory explanation was given for all observed phenomena in relation to light and color, and the undulatory theory was firmly established. The discoveries of Fresnal regarding light awoke new interest as to the cause of heat.

The world is indebted to Benjamin Thompson, an American philosopher, who spent nearly all his life in Europe, and there received the title of Count Rumford, for a satisfactory demonstration that heat is not matter. In the year 1792, he published an account of his experiments in producing heat by means of friction. His attention was first turned to this subject on observing the vast amount of heat generated in boring cannon. He accordingly constructed a cylinder, which was carefully surrounded with non-conducting substances; in this was a closely fitting piston or plunge,

which, with proper gearing, was moved by two horses. The cylinder was placed in a vertical position and filled with water. By the friction of the plunger and cylinder the water was gradually heated, and at the end of two hours and a half it actually boiled. Of course it was quite apparent that the process could be continued for any length of time and heat be constantly generated. Although this experiment proved decisively that heat was the result of motion, still the majority of scientific men continued to regard heat as matter; and that portion which entered bodies without increasing their temperature, they called latent heat. The Scotch philosopher, Dr. Black, in 1780, was the most prominent of the advocates of the material theory, and his explanations of all phenomena regarding heat have been accepted and promulgated in nearly all seminaries of learning down to the present day. Many teachers there were, undoubtedly, who inclined to the motion theory, yet continued to present his views because they could be quite readily comprehended by the pupil.

After the explanation of the manner in which a ray of light is polarized by the peculiar action of transverse vibrations, Melloni turned his attention to the action of heat in the sunbeam, and demonstrated that its rays, too, could be polarized, and the natural inference followed that heat is the result of undulations moving around, and in all directions transversely to the line of the ray. How this motion is modified after the entrance of the heat ray into a ponderable body is still a mystery. That its effect is to push asunder the molecules or atoms and counteract the force of cohesion, and at the same time give an axial motion to such atoms when the body has assumed a liquid or gaseous form, must be admitted. The internal action of the heat force in ponderable matter presents a vast field yet to be explored.

Heat as well as light being considered to be the result of wave motions of extremely subtle ethereal fluids, it becomes an interesting query whether these effects, as well as that of actinism, are not due to the diverse action of the same fluid. This hypothesis enables us to form a conception of the manner in which these several forces act, while it is quite impossible to conceive how a separate and distinct fluid, for each of these forces, as well as those of electricity and magnetism, can act simultaneously. The plausibility of the hypothesis is increased by an examination of the decomposed sunbeam.

If a ray of light enters and is passed through a glass prism, its spectrum presents to the eye seven colors in the following order: red, orange, yellow, green, blue, indigo and violet, the last having the greatest refrangibility and the first the least. The number of undulations of the ethereal medium producing each color, increases from the red up to the violet. By the use of the electro-pile of Nobili, it has been discovered that the amount of heat in the violet ray is least, and that it increases in each color to the red; but what is most remarkable, the heat increases far beyond the red ray among the invisible rays of least refrangibility. On the other hand, the chemical effect known as actinism, upon which the photographer relies for his picture, increases from the blue to the violet.

In papers read before the American Photographical Society, he, the Chairman, had endeavored to show that these three solar effects, heat,

light and actinism, are the products of the same highly attenuated imponderable fluid, moving in waves of different lengths. The eye is sensitive only to the action of one octave of waves, and the impression of color depends on the relation of the velocities of these waves with each other, that is, on the ratio of vibrations. Thus, the apparent paradox of the lightest color, yellow, and darkest, indigo, being within, rather than at the extreme of the spectrum, is accounted for by harmonial relations alone.

The longer waves of ether, or aeth waves, give the sensation of heat, and the greater the amplitude of the wave the stronger is the heat force. These longer waves may give rise to shorter waves by sympathetic action, as a musical note of a given pitch excites other sounds called harmonica, thereby setting in motion the waves of the middle octave, on which the sensation of light depends. Thus we find that all ponderable bodies, at a certain temperature, become luminous. Thus, too, actinic effects are generated from heat; they commence in the blue ray, increase in force to the violet, and extend beyond into the invisible rays of the spectrum. The peculiar action, called actinism or chemical power, depends, probably, upon the decreased length of the waves of the all-pervading fluid. The cause of this phenomenon need not be explained here, further than the simple statement that as the waves are shortened and approach in length to the diameter of atoms, their power for disintegration increases.

It was not the purpose of the Chair to indulge in a philosophical disquisition in elucidation of these intricate subjects, but to explain a nomenclature previously presented by him at the American Photographical Society, which is designed to distinguish all the phenomena attending the action of imponderable matter by names having a common root, and yet resembling those now in general use sufficiently to prevent any misconception with regard to their meaning. The greatest impediment to the progress of science, thus far, has been the use of terms not easily remembered. The nomenclature of Lavoisier, although far from perfect, has contributed more than any one change towards the dissemination of chemical knowledge; on the other hand botany is still obscured by terms, because it is now more difficult to remember the names than the nature of plants.

Matter is wholly comprised in two classes, ponderable and imponderable. That having weight and bulk, exists either in a solid, liquid or gaseous state; but that which can neither be weighed nor measured cannot be distinguished by subdivisions. We can only assert that there is a subtle, imponderable, impalpable, elastic fluid pervading all space, as the connecting medium between celestial bodies, and permeating all ponderable substances, filling the pores, so to speak, and connecting atom with atom, as, in a far more rarified form, it connects star with star. This fluid has been distinguished by the term ether, derived from a Latin word, which means shining, but the same word ether is used in chemistry to designate volatile substances, and particularly that which consists of four atoms of carbon, five of hydrogen and one of oxygen. It is proposed to use only a part of the original Latin word, and to restore the dipthong æ, so that this peculiar fluid will be distinguished by a name radically different from all others, æth. To pronounce this word requires the forcing of the breath through a passage partially closed by the pressure of the tongue upon the

upper teeth. In this case the sound expresses the curious permeating qualities of the fluid. The name æth, or, if preferable, eeth, is short and peculiar, and in every way admirably adapted to distinguish this most mysterious kind of matter.* We are aided in our conceptions with regard to the motions of æth by a comparison with motions of air. When æth moves in currents it resembles *wind;* when it moves in waves it resembles *sound.* It should be remembered, however, that air waves producing sound, move to and from a center of motion, alternately expanding and condensing the air in the same sight line, while æth waves move transversely to line of the ray. The forces manifested through the wave motion are three, and are distinguished thus: 1st. The force of heat by the name ætheat. 2d. That of light, by æthight. 3d. That of actinism, by æthac. It will be noticed that the effects of wave motion are designated by words formed by placing another syllable after the word æth. All other manifestations of change or force in æth are designated by prefixes. Thus, the force passing through æth in currents, known as electricity, is designated by curæth. According to the theory of Franklin, the positive and negative condition of electricity is produced by an excess or deficiency of the fluid; condensed æth is therefore designated as condæth, and rarified æth as raræth. That force of æth, known as magnetism, will properly be called magnæth.

To return again to the phenomena of æth in undulation, it is often essential to speak of the calorific, colorific and chemical effects as exhibited strictly within the luminous spectrum; these are designated severally as calæthight, colæthight and chemæthight. That anomaly in the action of light which is the force of that portion of the sheaf of waves moving in the same plane, called polarization, is designated as polæthight. A similar effect of the waves of invisible rays producing heat is called polætheat.

It is evident that any newly discovered action of æth can easily be distinguished by compound words similar to those already given.

Mr. Enos Stevens spoke of the changes of temperature caused by atmospheric pressure; the attraction which produces tidal influences affects the atmosphere in a similar way; it is alternately contracted and expanded, thereby giving rise to heat and cold. He believed many of our sudden changes of temperature had this origin rather than that which arises from the direct action of the sun in rarifying the air. It is from the atmospheric coating of the earth that much heat is given to and taken from the animals upon it. According to this supposition, that the heat of the sun depends on the thickness of this coating, we may conceive how planets receiving different amounts of heat from the sun may have nearly an equal temperature on their solid surfaces. If atmospheric pressure modifies temperature, and that pressure is affected by the changes in the attractive power of celestial bodies, it follows that what may be called the tidal element must enter into many of our meteorological calculations.

* As this article goes to press, we add that Prof. Tyndall, of the Royal Institution of Great Britain, in his admirable lectures just published, says: "If we could change either the name given to the interstellar medium, or that given to certain volatile liquids by chemists, it would be an advantage. It is difficult to avoid confusion in the use of the same name for objects so utterly diverse."

The subject selected for the next discussion was "The Use of Steam Expansively."

Adjourned. Enos Stevens, *Secretary pro tem.*

American Institute Polytechnic Association,
February 12, 1863.

The Chairman, S. D. Tillman, Esq., presiding.

Mr. Fisher read a paper of considerable length, in which he presented his own views of the changes needed in the patent laws.

Clinton Rosevelt, Esq., replied, and endeavored to show that any so-called reform, which virtually deprived the inventor of the sole control of his own invention, was wrong in principle.

A communication presented from Dr. D. J. Macgowan, inclosing a prospectus of the "London Permanent Exposition," was placed on file.

The Autophoneon.

Dr. Rich, on behalf of the committee appointed to examine the new musical instrument of Mr. Joseph Dixon, of Jersey City, made the following report which was accepted:

The committee appointed to examine a new musical instrument, constructed by Joseph Dixon, report that they proceeded to his residencee in Jersey City, and were ushered into a music room in which is placed an automatic organ, called by the inventor an "Autophoneon." The case is eleven feet high, nine feet long, and four feet deep; it has a front of finely wrought rosewood; but a portion of the apparatus is in the story below, so that the actual height of the instrument is twenty-one feet. It has a keyboard of five and a half octaves, and twelve stops, for the use of an organist. After listening to several "voluntaries," which displayed the fine tones and capacity of the instrument, the organist retired, and the inventor touched a lever, when a series of waltzes and familiar airs followed, with a fullness of harmony and brilliancy of execution which were truly astonishing. The front lid of the instrument was then raised, exposing to view the principal machinery by which these marvelous effects were produced. Above the keyboard was seen a cylinder seven feet three inches in length, and thirty-four inches in circumference. Upon this immense barrel are placed the brass pins and staples which operate the keys of the instrument. The pitch of the sounds depends upon the longitudinal position of the pins or staples, and the length of the sounds depends upon the length of the staples in the direction of the circumference. Above the cylinder is a brass bar extending from one end of the instrument to the other, having on its lower side finely cut slots, one-half of an inch apart, in each of which a steel finger, fitted with great accuracy, plays in a vertical direction. The number of fingers is 166. The advantage gained by this great number of keys is that the instrument gives the complete harmony as arranged for an orchestra, each series of pipes having a separate and independent part. The cylinder contains several thousand pins and staples, or enough to play

640 bars of music in "two-four" time, with all the parts as performed by a full band. The increased or diminished dynamic effect is regulated by steel fingers, which also set in motion the pneumatic action operating the drums.

The distance between the steel fingers is sufficient to allow eight rows of pins and staples to be placed upon the cylinder, which, by a lateral motion, brings each row in turn under a finger, so that in eight revolutions of the cylinder each finger has traversed a path of pins 272 inches in length; this number, multiplied by 166, shows that the whole distance traversed by all the fingers is 3,762 feet and 8 inches.

Ten cylinders have already been made, and the pins and staples have been arranged on four of them. The work is done by first covering the cylinder completely and firmly with white paper, on which, by means of the fingers and a graduating machine, the position of the pins and the length of the staples is marked. After the pins and staples have been driven into the wood to the proper depth, the paper is removed. The time required for arranging the pins and staples on one cylinder is three months. In order to obtain a perfectly smooth and uniform surface, presenting everywhere the same arrangement of grain for holding the pins, it was found necessary to construct the cylinders from solid logs. The basswood trees required were cut at the right time in the forests of Schoharie county; and after proper seasoning were bored, so as to leave a shell of about three-quarters of an inch thick, by machinery especially constructed for this purpose at a cost of several hundred dollars. The cylinders are highly polished and have their ends inclosed by brass disks, of diameter sufficient to form a protecting rim; connected with these disks are the axles on which, when in place, the cylinder revolves. The linear extent of the ten cylinders, placed end to end, exceeds seventy-five feet.

A weight of 300 pounds, which is so geared as to be easily moved, is raised to a height of eleven feet; and, when connected with the cylinder, causes it to revolve for about one hour and a half. The speed is regulated by a fan wheel. The bellows, which supplies the pipes with wind, is placed in the story below and operated by a novel hydraulic apparatus, which is self-acting, that is to say, its valves are tripped internally, faster or slower as more or less wind is required; the bellows itself always directing the movement. A correct idea of this ingenious contrivance cannot be given without drawings.

It only remains to speak of the pipes. They have been constructed with great care, a large number having been rejected after subjection to trial. The points satisfactorily attained are correct imitations of the sounds of not only the wood and brass instruments, but also of the stringed instruments of the orchestra. Having perfected this part of the "Autophoneon," the inventor is able to give the correct interpretation of all written music. For instance, the complete overtures of "Don Giovanni" and "Figaro" are played with surprising sweetness and power. The slow and solemn anthem and the exciting music of the dance are equally within its range and capacity. It not only executes the most rapid passages, but adds those peculiar effects which can only be produced by contrasts in the *timbre* and dynamics of sound.

Eight years have elapsed since Mr. Dixon commenced the construction

of this instrument for his own use; and the cost thus far is nearly ten thousand dollars ! Instruments somewhat similar to this belong to several of the crowned heads of Europe, but they are all of inferior size. It is a matter of especial gratification to every American that the largest automatic musical instrument ever constructed has been planned and completed by a single enterprising fellow-citizen, who, in following the bent of his genius, has demonstrated how far machinery, which arleady has the credit of doing the drudgery of the world, can be made to minister to our more refined tastes. Respectfully submitted.

JOHN B. RICH, *Chairman.*

The regular subject of the evening, "Improvements in Modern Warfare," was then taken up.

MARINE ARTILLERY.

Mr. Norman Wiard.—In preparing the expedition of General Burnside for service in North Carolina, it was decided to organize a new branch of the service, to be called marine artillery. As superintendent of ordnance stores, I was directed to consult with Col. Wm. A. Howard, and supply the necessary guns, carriages and implements for the purpose, and, accordingly, twelve steel 12-pounder rifled boat howitzers were provided, of my fabrication, each with a sliding and field carriage, implements and ammunition, and four 6-pounder "Wiard" field guns, equipped so as to adapt them to be used in the same manner. Colonel Howard enlisted the men, caused the launches to be made, and secured two light-draught steamboats, as suitable for the purpose as possible. On one of these steamboats four guns were placed, and on the other one two, and each of the gunboats of the fleet was prepared to receive one or more of them, if exigencies should make it proper to use them in that manner. Notwithstanding the preparation was in a measure inperfectly made, from the fact that proper steamboats could not be procured in the limited time allowed for fitting out the expedition, these guns have borne an important part in every battle in that State, and have been spoken of by General Foster, as forming "an essential part of all coastwise expeditions to be fitted out in future." It has frequently been reported to me by officers in the army of North Carolina, that light-draught steamboats were necessary to the complete success of marine artillery, and Gen. Foster reported to the ordnance department that, "with the addition of a light-limber, the use of these guns need not be confined to the seacoast." Having been successful in constructing light-draught and fast steamboats for western rivers, I conceived the idea of designing a boat for the marine artillery, and when the Picket, which drew five feet of water, and was the best boat for the purpose in the Burnside expedition, was blown up by the explosion of her magazine, I exhibited the drawings of a boat that I had designed to Colonel Howard, and he expressed himself delighted with it. I had previously, at his request, designed a light-limber and harness, with which he was also so much pleased that he procured a requisition from Gen. Foster for twelve of them. I exhibited my plans for marine artillery equipment to Gen. Banks, and he so far approved of them that he directed me to provide for his expedition twelve guns, with car-

riages, launches, and all the equipment, except the steamboats, which there was no time to prepare before his expedition sailed, and he hoped to make up this deficiency from some of the light-draught steamboats that he might be able to procure at his place of destination.

The organization of the marine artillery, for continuous active duty with light-draught steamboats, instead of the heavier ships of the navy, for coast, river, and land service, has created the necessity for a manual, in which a full and detailed description of the outfit and equipment of the guns, steamboats, and launches should be incorporated with instructions for the service of the guns on the steamboats, in launches and on shore, which, however, has not yet been provided. I have such a manual in preparation, and hold myself ready to complete it whenever the war department may request it, without charge for my services.

By adopting so much of the equipment and service of the piece as is available from the naval boat gun service, we have a light artillery that much excels other light artillery yet adopted by the ordnance departments of the United States or foreign nations. For instance, five regiments of marine artillery would be supplied with sixty guns, sixty launches, and ten light-draught steamboats. Let us suppose such an armament attached to the army of the Potomac, for operation on Chesapeake bay and the rivers and creeks of Virginia; the men can be enlisted more readily than for any other branch of the service, from sailors in the lake and seacoast ports who are not fit for soldiers, and who will not enlist in the regular navy. From this source large additions to the forces would be received that would not otherwise be had. To insure its utmost efficiency, however, this branch of the service should receive complete official indorsement and recognition; then much dash and *esprit-du-corps* may be expected from it. The steamboats would be superior transports, when required for that purpose, and, when they are not engaged in active duty, could run up rivers and creeks that other steam crafts could not enter, for they draw but thirty inches of water when loaded. No wharves or docks would be required; such transports could run up the river bank or beach, to take on or put off their load. When the *corps* is not on active duty the men may go into camp on shore. Each boat can, upon an emergency, take five hundred men, and the launches easily fifty more each, to be towed; thus eight hundred men by this means could be transported along or across a river at each trip. The launches could be used for expeditions up rivers with oars; for an army crossing a river, or, as pontoon bridges; and the guns can be fired on the steamboats, and in one minute fired from a launch, manned and ready to dash ashore; the gun can be fired from the launch as the beach is reached, and in one minute changed to its field carriage, run ashore and fired from the beach; this feat has been repeatedly performed. When on shore, the guns on their light iron carriages are drawn by the crew, and if the roads are impassable for other guns, can be taken to pieces and carried in parts by the crew, by the use of the spars and straps provided as part of the equipment. If a raid is to be made far inland, limbers are provided, by which the gun and ammunition are drawn by horses. No arm of the service could be so effective as marine artillery in their launches manned with fifty sailors, armed with cutlass,

pistol, and breech-loading carbine; each launch having a twelve-pounder rifled cannon, to protect the crossing of troops, or in laying a pontoon bridge, as at Fredericksburg, where such service had to be performed by infantry, with pontoon boats. The cost of preparation for five regiments with sixty guns would not be greater than the cost of ten batteries of field artillery with the same number of guns, and the "*state of the roads*" would not render their arrival at *an appointed place at an appointed time* uncertain.

The proper equipment of marine artillery for a regiment with twelve guns is:

Two light-draught steamboats, with supplies.

Twelve launches, 8 feet wide, 30 feet long.

Twelve boat howitzers.

Twelve sliding carriages.

Twelve limbers.

Thirty horses and harness.

One hundred and twenty ammunition boxes, with partitions for 10 rounds for the smooth bore howitzer, and 12 rounds for the rifle.

Seventy-two spars, five feet long, three inches in diameter, for carrying guns.

Two hundred straps for do.

Twelve awnings for launches.

Twelve lines, 200 fathoms in length, with spring hook at one end.

Twelve sets of oars, boat hooks, and poles, for launches.

Twelve boxes spare articles.

Twelve sets of gun implements.

Twenty-four pivot bolts for sliding carriages.

Twenty-four grapnels, with 30 fathoms of line to each.

Twelve pairs of skids for landing guns.

Twenty-four tow lines for copper tanks, when overboard the launches.

Twelve balls of strong twine.

Four canvas slings to put horses overboard.

Twenty-four corn sacks.

Twelve wooden buoys.

Twelve paulins.

Six hundred boarding pikes, staves eight feet long.

THE STEAMBOATS, AND EQUIPMENT FOR ONE BOAT.

Six launches.

Two anchors, 600 pounds each, 60 fathoms chain.

One large kitchen range, and the usual cooking utensils for four hundred men.

One set of cabin furniture for officers' cabin.

Sixteen sets of state-room furniture, and bedding for three berths in each.

Two ship's compasses for pilot-houses.

One glass.

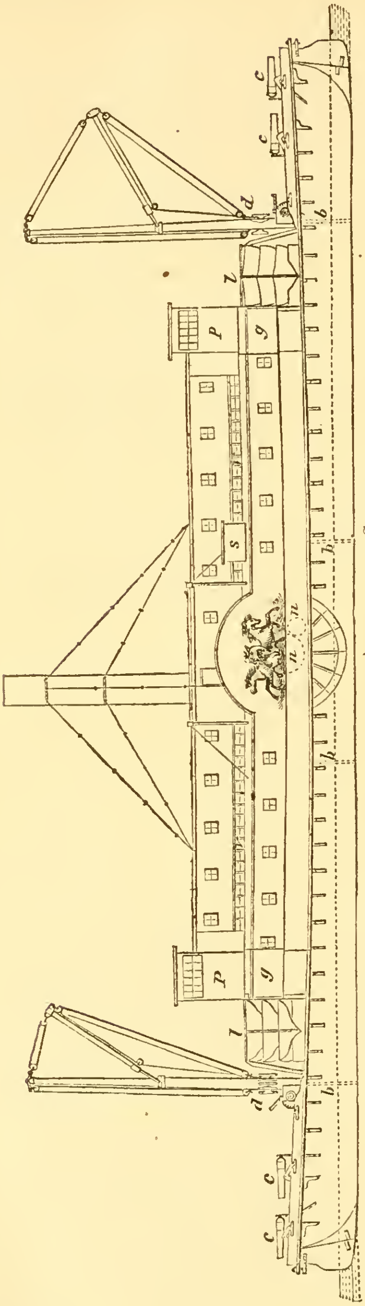
Six copper magazine tanks for small arm ammunition.

One portable forge for machine shop.

One anvil for machine shop.

One bench vice for machine shop.

One chipping hammer.
Two screw wrenches.
Six files with handles.

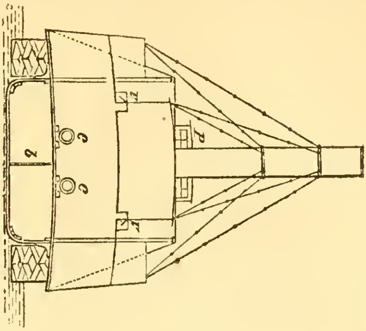


Length over all, 160 feet.
Breadth of beam, 21 feet 4 inches.
Breadth over all, 34 feet.
Wheels are 16 feet diameter, 5 feet face.
b b b b Athwart ship bulk-heads.
c c c c Guns on sliding carriages.
d d Winches for hoisting.
p p Pilot-house.

g g Gangways.
l l Launches.
n n Mortice wheel and pinion.
s Companion-way.
v v Ventilation for lower deck.
Draft when loaded, 30 inches.
Draft when light, 22 inches.

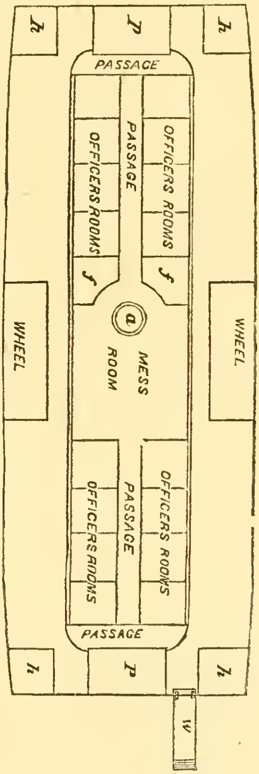
Four cold chisels.
Two oil cans.

One oil tank.
Six casks for water.
Two bilge pumps, connected to engines and with hand gear.



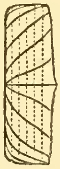
CROSS SECTION.

b Bulk-head.
e e Engines.
P Pilot-house.
v v Ventilation whole length of the officers' quarters.



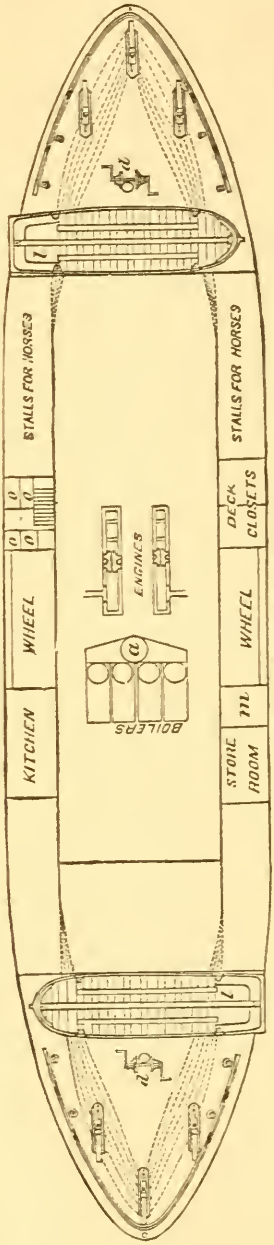
PROMENADE DECK AND OFFICERS' QUARTERS.

h h h h Hatches over gangways.
f f Pantries.
P P Pilot-houses.
a Chimney.
W Portable way, and step-ladder to pass to forward deck, when launches are on board.



MODEL LINES.

The engines of the boats are two in number, with cylinders of fourteen inches diameter and twenty-four inches length of stroke, working steam expansively, furnished with surface condensers and regenerators, by which not only the boilers are completely supplied with fresh water, but a suffi-



PLAN OF MAIN DECK.

a. Chimney.
l l. Launches.
d d. Winches.
m. Machine shop.

cient additional quantity for all other uses for the consumption of 400 men is attained.

The boilers are four in number, and have 1,260 feet of heating surface

and but little radiating surface, and are set in pairs and so arranged that a strong draught through inclined tubes is attained without blowers; but little thickness of metal is interposed throughout the whole boiler, between the fire and the water.

The wheels are Irving's patent, sixteen feet in diameter, and five feet face, entirely of iron. On the shaft of each wheel is a core-wheel five feet in diameter, with wooden cogs, ten inches face, into which works a cut pinion, twenty-four inches diameter on the engine shafts. The engines make 100 double strokes while the wheels make forty revolutions. By the use of these wheels and these devices I attain lightness that is very essential, absence of noise and jarring or trembling of the light frame-work of the boat.

The bulk-heads are five in number, made of double thickness, of pieces sixteen feet long, six inches wide, and one inch thick. These pieces are matched with a tongue and groove like common flooring, and put up for the fore and aft bulk-heads, inclined diagonally in opposite directions, and are clinker clinched with wrought nails at each intersection or crossing of the parts; four other bulk-heads are inserted, as shown by dotted lines on the cut showing the elevation of the boat.

The quarters for the men are between decks and below well lighted, and ventilated by sashes under the seat on the promenade deck that reach the whole length of the officers' cabin on each side. Between decks is the kitchen, a store-room, a machine-shop, stalls for thirty horses, and capacious water-closets for men and officers; and on the promenade deck are the officers' quarters, a long mess-room, state-room, and two pilot-houses with passages.

The spars for hoisting are so placed as to be convenient for putting off or on the launches, guns and carriages, and the horses. Each spar is furnished with geared winches, and the boom is so rigged as to have its peak raised or lowered to lay down or take up articles at any distance within its radius from the foot of the spar. Horses are put in and out by the use of canvas slings buckled about their bodies, the slings having loops on the backs to attach the hook of the tackle on the boom. The plank of the bottom is all fastened with copper-covered rivets; this manner of fastening gives great strength with lightness, and the bottom is coppered.

With the coast of Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Texas to assault and defend, the whole of which is a net-work of shallow waters, of sounds, bays, inlets, rivers and creeks, with only a few places where it can be approached with heavier ships, it would seem to be indispensable that the government should have a great number of the fast and light-draught steamboats above described, which, from their peculiar adaptation and equipment, would seem to be especially calculated for that duty, and designed to meet all the conditions required.

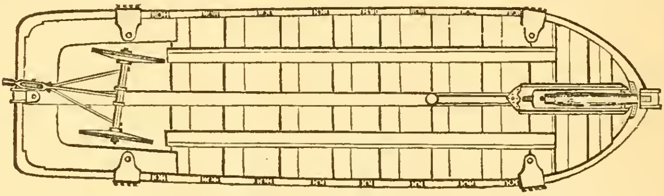
Their speed will enable them to retreat to shallow water from any enemy afloat, and a retreat to the launches or boat, from an assault on land, would insure the safety of the party; while for secret expeditions up creeks or rivers, or into a more easily approached harbor in the night, their assault would be very formidable. The enemy, too, could be watched from seven

points with the steamboat and six launches, and an assault by boarding from the crews of six launches, each with a rifled twelve-pounder gun, and with small arms, including pikes, could scarcely be resisted by any ship, if it was conducted in the night and with proper vigor.

These boats would not alone be useful for the purposes above described; they are powerful tugs and good transports for men and stores, shipping and transhipping; where there are no wharves or docks running up to the beach or river bank to take on or put off their load, whether of stores, men, horses or cattle, and could not be excelled, under many circumstances that could be described, for use as lighters for transhipping from heavier transports; and I have offered them, completely equipped.

LAUNCHES.

The launches are eight feet wide, thirty feet long, and three feet deep; have three pivot sockets at bow and stern, at the points of a triangle, that the sliding carriage may be fixed in any two of the points with the pivot



bolts; two tracks placed fore and aft, the proper width apart, for the wheels of the field carriage; two skids, with hooks at the ends to fix in eyes at bow and stern, continue the track to the beach, for the support of the field carriage on landing. Sixteen oars are becketed to thole pins for use. The pins have a piece of India rubber tube slipped over them, and the oar rests on a piece of rubber let into the gunwale to muffle their sound.

Each launch has four water-beakers, and a band is placed near the ends with an eye, by which the beaker with water can be suspended under the limber when the gun's crew make a raid into the country, away from the boats. Each launch has twelve passing boxes, in which each of the gun's crew can carry one round of ammunition on landing; and two copper magazine tanks are furnished, made water tight, to which a line can be attached. When a launch is under fire the magazines should be overboard, and towed five or ten fathoms behind. Each magazine will float with one hundred pounds of powder. Two grapnels with thirty fathoms of line are to be thrown overboard, outside the surf, in landing, to haul off the boat as soon as the gun and gun's crew are landed. This would be indispensable in landing on a beach in a heavy sea, and often in a marsh at the side of a river. If a grapnel line has to be cast away, a buoy should be found on board and attached to the inboard end of the line, that it may be recovered afterwards.

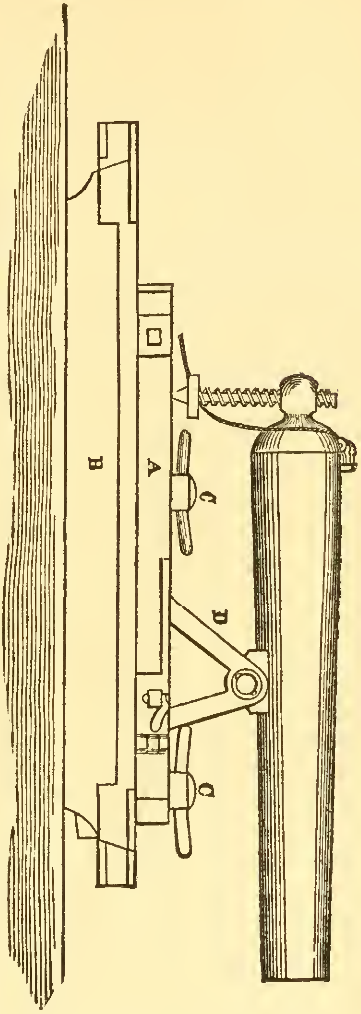
THE GUNS

are steel, rifled, and smooth-bore. The weight of each is 783 pounds.

The rifled howitzer is three inches caliber, and the smooth-bore $4\frac{62}{100}$ inches caliber, both of the same exterior form, and they will interchange on the sliding or field carriage.

SLIDING CARRIAGES

are used in the launches and on board the steamboats.



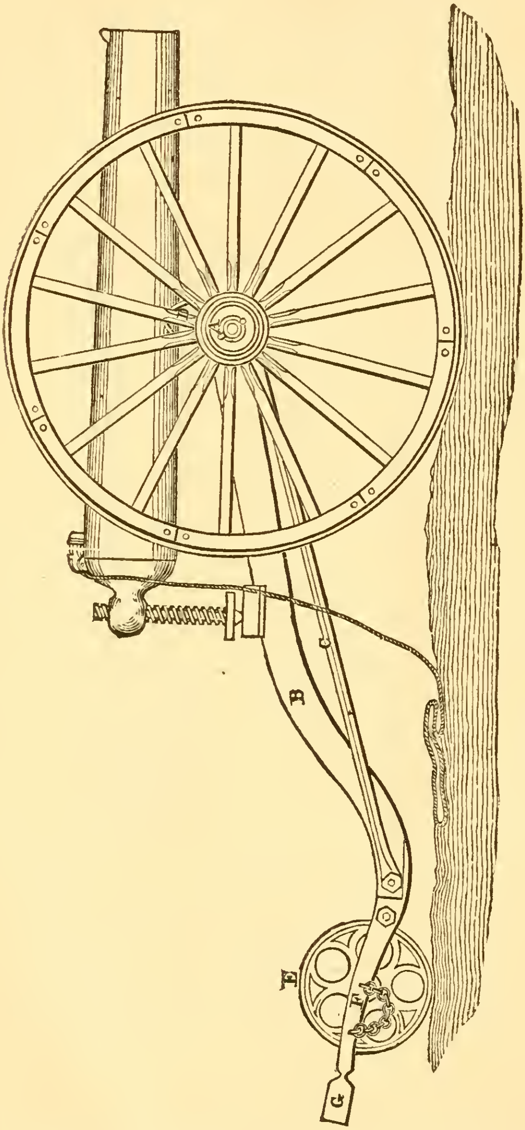
(A)—Bed.
(B)—Slide.
—— Compressor plate, } beneath the slide, and not shown on the plate.
—— " bolts,
(C)— " handles.
(D)—Lugs for loop.

The recoil is controlled by compressing the slide between the bed and the lower plate; for which purpose the bolts connecting the upper and lower pieces have a thread above, and a corresponding nut with handles. These are set as firmly as the strength of an ordinary man allows, and will then always suffice to keep the recoil within the limits of the slot in the slide. After discharging the howitzer, the compression is relieved, and the piece run out.

In order that this arrangement may invariably perform its function, it is necessary that the surfaces of the carriage, to be in contact, should be plane, which will be known to be otherwise when the compression is not found to be sufficient to control the recoil. In this case, dismount the gun, take the

carriage apart, and examine the surfaces of the parts. Wherever the coincidence does occur, the wood will be worn smooth; let this be removed in the slightest manner, and the surfaces corrected generally, which will be found to reduce the recoil; but remember that, in making a plane surface, it is by no means necessary to make it smooth; it should be as little so as possible for the present purpose.

If the carriage moves out on the slide with difficulty when the compressors are free, it is owing to the guide in the slot having swelled or warped,

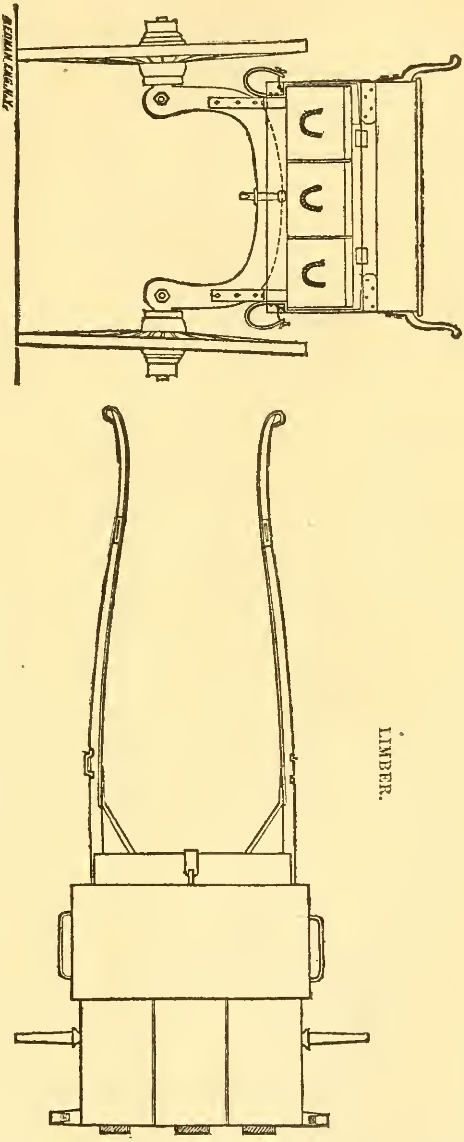


THE NOMENCLATURE OF THE FIELD CARRIAGE IS—

(*A*)—Axle.
(*B*)—Trail.
(*C*)—Braces.
(*D*)—Lugs for loop.
(*E*)—Trail wheel or runner.
(*F*)—Bolt for wheel or runner.
(*G*)—Socket for handspike.
(*H*)—Elevator.
(*J*)—Dise of elevator.
(*K*)—Box for elevator.

and will be easily remedied by removing a very slight shaving from its sides.

With all the care that can possibly be taken in selecting seasoned stuff it is well known that the continued exposure alternately to sun and rain, incidental to sea service, will after a while warp material of the best quality, and, therefore, it will be necessary, with a new carriage, to examine it occasionally, and correct the evil.



LIMBER.

REAR ELEVATION.

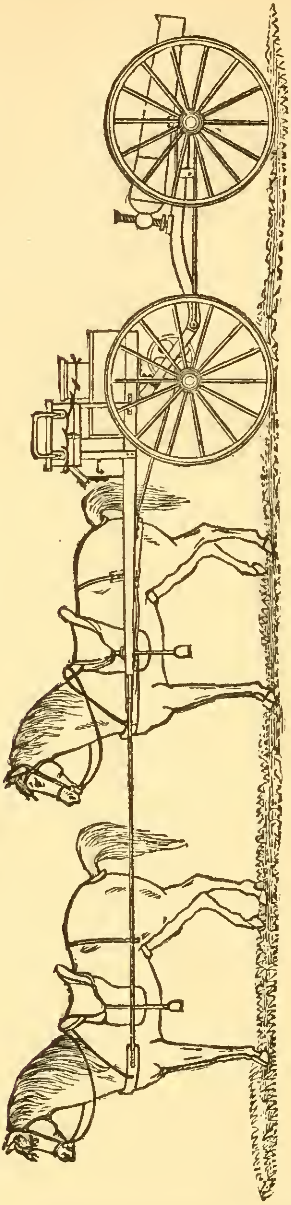
PLAN.

The hooks seen at the end of the shafts, on the rear elevation, are for convenience of carrying boarding pikes and spars for lightering parts over bad roads.

With very little attention, the compressors will be found to perform their part in controlling the recoil even of the most active of these pieces.

The force of recoil thus resisted may be appreciated by the fact that this piece, being mounted in the bow of a frigate's third cutter, $27\frac{1}{2}$ feet in length, with at least twelve persons in, besides the gun, ammunition, oars,

etc., would, when fired, send the boat many yards astern, in smooth water. And yet the application of this force produced no effect on the frame of the



THE GUN LIMBERED UP.

En route.—The gun's crew march beside the piece, carrying the implements, as infantry carry arms. The piece can then be in battery without delay, and assistance given over a bad part of the road promptly.

boat—not even the paint over the plank-ends having been disturbed by a hundred rounds, fired chiefly when the boat was under full way.

The field carriage is of wrought iron and weighs 500 pounds.

LIMBERS

Are provided, that the service of boat howitzers need not be confined to the sea coast.

The limber carries three boxes of ammunition, the spare article box, mess chest, and a box for pea jackets of the men. Eyes are affixed on each side of the shafts for straps, to secure the boarding pikes, and two hooks under the shafts will carry a water beaker; the drag rope is passed around the boxes on the limber for use in any emergency.

Weight of the parts of Limbers.

Two wheels	188 lbs.
One pea jacket box	55 "
One mess chest	56 "
One body	313 "
Total	612 lbs.

If a wheel is disabled on the gun carriage, it should be taken from the limber; if the gun carriage is altogether disabled, the gun can be triced up under the limber, using the drag rope to lash it fast; lashing cord should always be found in the till of the pea jacket box. The harness is made up of artillery and mountain howitzer harness parts; the bridle, halter, saddles, and cruppers being from field artillery harness, the balance from mountain howitzer harness.

HARNESS

Is made up from the field artillery harness:

Two driver's saddles and girths.

Two halters.

Two bridles.

Two loop straps and cruppers.

One trace loop.

And from the mountain howitzer harness:

Two breast straps.

Two breechings.

There are also two shaft loops fixed to saddle tree under stirrup strap.

Two traces one-fifth of an inch wide, three thicknesses leather, with spring hooks to hitch leader to shafts.

Two shaft girths.

One pair leg guards on stirrup strap.

AMMUNITION BOXES

Are made to contain twelve rounds for the rifle gun, and nine rounds for the smooth bore twelve-pounder. The kind of ammunition in the box is plainly marked on the outside, and the marks should be carefully noted in packing the ammunition anew. Rope handles are fixed on each end of the boxes, by which they should always be handled carefully. A key to withdraw the screws to open the lid should always be found becketed to each box. There are dowels on the frame of the gun carriage by which the boxes are steadied in their place in moving; also on the limber; two boxes are carried on the gun carriage, and three on the limber. Two more can be lashed on the gun carriage and two on the limber, if necessary.

THE MAGAZINE TANKS

Are of copper, with capacity for one hundred pounds of powder. They are water-tight and can be put overboard from the launch and towed by a line astern, to prevent explosion whenever the launch is under fire.

A REGIMENT OF MARINE ARTILLERY

Consists of from four to six hundred men, divided for duty into gun's crew, launch crew and horsemen.

Adjourned. THOMAS. D. STETSON, *Secretary.*

AMERICAN INSTITUTE POLYTECHNIC ASSOCIATION,
February 19, 1863.

The Chairman, S. D. TILLMAN, Esq., presiding.

Mr. Fisher directed the attention of the meeting to the practicability of using steam traction engines upon city railroads, and described the dummy engines used on the Hudson River railroad, also the steam cars of Grigg & Long, now used upon the railroad leading from Jersey City to Bergen Point. The driving engines are placed on the forward platform of the car, and occupy but little space; the exhaust steam makes very little noise. While passing through the city a span of horses are attached to the car, and thus do not frighten any animals on the road. A number of these steam cars are now in use, and if they are successful on this road their great economy will lead to their introduction on other roads as fast as permission to move on city roads can be obtained.

Mr. Rowell read a description of the trial trip of an ocean steamer, using the Sickles' cut off, published in a morning paper, and took occasion to condemn the sweeping statements with regard to the speed of the steamer and the working of the cut off.

Mr. Stetson also made some remarks on the absurdity of the statement read, especially in regard to the amount of coal used, and the speed of the ship.

Mr. Dibben followed in the same strain.

Mr. Rowell then took up the subject of the cut off, and denied that there was any saving in using steam expansively. In the course of his remarks he referred to the experiments made at the Hecker mills in this city, and those made on a lake steamer by the government, and cited the opinions of chief engineer Isherwood, who has taken substantially the same ground.

Mr. Fisher took the opposite ground, and showed, by reference to the published experiments made with locomotives in England, there was a large saving by using the steam expansively in the high pressure engine.

Mr. Stetson followed upon the use of the expansive power of steam in low pressure engines. He showed, at some length, the effects of alternate heating and cooling of the cylinder, and described the manner in which the Corlies' engines (noted for their saving of coal) were arranged. On motion the question was continued to the next meeting.

C. W. SMITH, *Secretary pro tem.*

American Institute Polytechnic Association,
February 26, 1863.

The Chairman, S. D. Tillman, Esq., presiding.

Mr. Bull presented a model and drawings of the improvements belonging to the iron railway company, which consist substantially in the substitution of wrought iron for wooden cross ties between the rails, which rest on cast iron pillars, each having a base of about two square feet. The bottom of the casting receiving the rail is cup-shaped and fits over the top of the cast pillar; between these two castings a desk of India rubber is placed so as to lessen the jar which is so destructive to the car.

Capt. Barnard explained the manner of laying down the rail with these iron connections.

On motion of Mr. Fisher, their models, drawing and description were referred to the committee on Manufactures, science and art of the Institute.

The question for discussion, "The Use of Steam Expansively," was then taken up.

An animated debate took place between Messrs. Dibben, Rowell, Fisher and E. N. Dickinson, Esq., the latter gentleman devoting nearly an hour to a critical examination of certain positions laid down regarding steam in the last work of Mr. Isherwood. It is to be regretted that a verbatim report could not have been made of this discussion.

The subject was continued to the next meeting.

Adjourned. Jireh Bull, *Secretary pro tem.*

American Institute Polytechnic Association,
March 6, 1863.

The Chairman, S. D. Tillman, Esq., presiding.

Mr. Henry B. Mattison, of this city, presented and explained his plan of a steam ram for harbor defence, the main feature of which is a shell in its hitting front so arranged as to be driven with great force into the vessel attacked, and when the ram is in the act of being withdrawn the shell is thereby fired. After the shell is discharged, the prow point is raised up, and another shell is placed upon it, and the ram is ready for another attack.

Mr. Dibben was of opinion that Mr. Mattison's invention could not be better than a gun placed low in the prow of a vessel, to be fired the instant the ram struck the enemy. He believed if the ram should run fast enough to penetrate the enemy's vessel before the shell was exploded, there was in reality no need of the shell, for the act of penetrating the vessel had insured its destruction. The vessel should be made to run twenty-five miles an hour, and when it struck the side of any vessel yet built, it would break it in; moreover, he objected to any hinges or joints in an apparatus that was subject to such strain as would arise by the collision of two immense iron clad vessels; all such adjustments would be torn off and the vessel would then be simply a ram.

After some further discussion upon the merits of Mr. Mattison's invention, the regular subject, "The Use of Steam Expansively," was taken up.

Mr. Fisher opened, and stated the conditions under which steam could be used expansively with profit; the main object should be to keep the steam dry and hot, and to this end a heated jacket around the cylinder was essential.

Dr. Warren Rowell.—Mr. Chairman, in order to show the theoretical and practical value of the use of steam expansively, it will be necessary first to show the theory as stated in several works on steam engines, some of which have been edited and published by Bourne, Lardner, and others. In the treatise on the steam engine, by the Artisan Club, edited by John Bourne, London, 1849, I find the following statement at page 12:

"The next improvement of Watts, that we have to mention, is his plan of working steam expansively. This method consists in arresting the flow of the steam into the cylinder, at a certain part of the stroke, leaving the remainder of the stroke to be accomplished by the effort of the steam shut up within the cylinder to occupy a large volume. The power of the engine is, of course, diminished by this procedure, for the piston will descend with less force when urged merely by the diminishing effort of the expanding steam, than if pressed upon by steam entering at full pressure to the end of the stroke. But steam, or in other words, fuel is saved in a greater proportion than the power of the engine is diminished, so that the expansive principle augments, and very materially too, the motive efficacy of the fuel. In fact, whatever power is obtained from the steam during the act of expanding, is obtained without any expense, for if the steam valve of the cylinder be closed when half the stroke of the piston is performed, there will only be half the steam expended; but the steam shut within the cylinder will press with a varying force on the piston to the end of the stroke, and the power thus realized is evidently got without any expenditure of fuel. We think it probable that this improvement originated in the desire merely to moderate the force of the single acting engine towards the end of the stroke, and indeed Prof. Robison, who, from his intimacy with Watt, was probably well acquainted with the circumstances of the discovery, virtually says that such was the case. * * * The realization of an increase of power * * * by this expedient was an unexpected result, but Watt immediately saw the importance of the principle, which, in a letter from Glasgow, in 1769, to Dr. Small, of Birmingham, he describes as doubling the effect of the steam. The distractions incidental to his other pursuits, prevented him from carrying the principle of expansion into practice till the year 1776, when it was tried upon the engine at Soho, and in 1778 it was applied to an engine for raising water erected at Shadwell. In 1782 Watt took out a patent for improvements in the steam engine, in which the principle of expansion formed a prominent feature; having been, probably, instigated to that act by a patent taken out by Hornblower, in 1781, for a method of using the steam twice over, by first impelling a small piston, by high pressure on Leopold's method, and then using it on a large piston by the method of condensation. This scheme is identical in principle with the plan of using the steam expansively, for it is obvious that the same power will be given out by a cylinder, whether it be tall and narrow or short and wide, provided its capacity remains the same.

"The subject of expansion, however, is so important, and at the same time so mysterious to *tyros* in steam science, that it would be unpardonable to pass it over without offering such further familiar elucidations as may make the principle intelligible to unskillful persons; and we believe these explanations may be here introduced with greater propriety than at a more advanced stage of our progress.

"It is a well known law of pneumatics that the pressure of elastic fluids varies inversely as the spaces into which they are compressed; for example, if a cubic foot of *air* be compressed into the space of half a cubic foot, its elasticity will be increased from fifteen pounds the square inch to thirty pounds the square inch, whereas if the volume be enlarged to two cubic feet its elasticity will be diminished to seven and a half pounds per square inch, just half the original pressure. The same law holds in all other proportions, and with all other gases and vapors, provided their temperature remain unchanged; and if a steam valve be closed when the piston has descended through one-fourth of the stroke, the steam within the cylinder, at the end of the stroke, will just exert one-fourth the initial pressure. Let the cylinder be supposed to be divided in its length into twenty equal parts, and its diameter into ten equal parts. If now the piston be supposed to descend through five of these divisions and the steam valve be shut, the pressure represented at each subsequent position of the piston, if computed by the well known laws of pneumatics, and which, if the initial pressure be represented by 100, will give a pressure of 50 at the middle of the stroke and 25 at the end of it. If this series be set off on the horizontal lines they will give the *hyperbolic curve;* the area of the part exterior to which represents the total efficacy of the stroke, and the interior area represents the diminishing effect when cut off at one-fourth the stroke. If the squares above the point where the steam is cut off be counted, they will be found to amount to 50, and if those beneath be estimated they will be found to amount to 68, and all these squares represent the power exerted, so that while an amount of power represented by 50 has been obtained by the expenditure of one-fourth of a cylinder full of steam, we get an amount of power represented by 68 without any expenditure of steam at all, merely by permitting the steam first used to expand into four times its original volume. The efficacy of a given quantity of steam is therefore more than doubled by expanding four times while the efficacy of each stroke is made one-half less, and therefore, to carry out the expansive system, the cylinders require to be larger in proportion to the extent to which expansion is carried. Every one acquainted with simple arithmetic can compute the terminal pressure of the steam when he knows the initial pressure and the point of cutting off, and by the same process any pressure intermediate. By setting down these pressures and taking their mean he can easily determine the effect with tolerable accuracy of any particular measure of expansion of which the mean pressure thus determined will be the representative. And as a summary of the ascertained effects of expansion will induce a more careful examination of the principle at a future stage of our progress, we may here set down some of the most notorious. Let the steam be stopped at one-half, its performance is multiplied 1.7; at one third, 2.1; one-fourth, 2.4; one-fifth, 2.6; one-sixth, 2.8; one-seventh, 3.0.

"The use of hyperbolic logarithms is indispensable to the computation of the exact power of an engine working expansively, and as tables of such logarithms are rarely in possession of practical men, we here give such an assortment as will suffice for the uses of the engineer."

Then, after describing the various kinds of boilers in use by the Cornish engines, he adds page 86:

"It will be seen, from what we have already advanced, that but a small part of the superior duty of the Cornish engine can be derived from the boilers; we must therefore look to the engines for the principal sources of superiority, which may be comprised under three heads:

First. The use of high pressure steam, cut off when a very small part of the stroke has been performed, and working expansively over the remainder.

Second. The careful clothing of every part of the engine where heat can escape, jacketing the cylinder, &c., &c.

Third. The main source of the great duty is to be found in the excellent system of registering and publishing the duty of each engine, which has prevailed in Cornwall for many years. It has made both the proprietors and engineers much more careful of a host of details that have elsewhere been considered too trifling to require notice, but which, in the aggregate, are of no small importance.

"The grand secret, however, of the economy of the Cornish engines lies in the large application of the principle of expansion, and the results there obtained are very little aided by any peculiar excellence in the boilers."

Then, after describing several engines and comparing point of cutting off and relative economy, he adds:

"Other causes may influence these comparisons, especially the last example, where one engine is a double acting rotative engine, and the other a single acting pumping one; but there is no doubt that the expansive action in the latter is the principal cause of its more economical performance.

"The mechanical effect of expansion is most readily determined by the principles of the integral calculus, and we prefer a recourse to that analysis on the present occasion. Steam, like all other gases, follows the law of "Manotte," which may be stated in the following words: "The volume of a given quantity is inversely proportional to the pressure to which it is subjected. Before this law can be rigorously applied to steam, it is necessary to suppose the temperature constant throughout the whole expansion; a supposition which, though not strictly correct, is so nearly true that we may reason upon it without material error.

"We must, however, dismissing these general considerations, now show the method of calculating the mechanical effect gained by this method of working steam engines, which is one of the most important topics of which we have to treat."

After giving the rule to find the increased efficiency, by working steam expansively, he gives example. "First, suppose that the pressure of the steam working an engine is 45 pounds on the square inch above the atmosphere, and that the steam is cut off at one-fourth the stroke, what is the increase of efficiency due to this measure of expansion? If one-fourth be reckoned as one, then four-fourths must be taken as four, and by refer-

ence to page 25, the Naperian logarithm of four, will be found to be 1.386, which is the increase of efficiency. The total efficiency of steam expended during the stroke, therefore, which without expansion would have been one, becomes 2.386 when expanded into four times its bulk, or in round numbers 2.4, as stated at page 12.

And then after another example, he says: of all the expedients for economizing fuel in steam engines, *expansion* is that which has been attended with the most success.

[From Brand's Encyclopedia, article, "Steam."]

"In the mechanical operation of steam, the pressure, density and temperature are supposed to remain the same during its action, and the mechanical effect is produced by the continual increase of the quantity of steam produced by evaporation from the boiler. Thus the piston is moved by the increased volume required, by the continual production of steam. It has been proved that, by this process alone, the evaporation of a cubic inch of water, whatever be the pressure under which it takes place, evolves a mechanical force equivalent to one ton raised one foot high. But if after this evaporation has been completed, the steam be separated from the water which produced it, and the load of the piston be gradually diminished, the steam would expand by moving the piston in virtue of its excess of pressure, and this expansion would continue until the pressure of the steam shall be reduced to an equality with the load on the piston. All mechanical effect, developed in this process, is due to the steam itself, independent of any further evaporation.

"To make this important quality of the expansive action of steam understood, let us suppose the piston to be loaded to the pressure of four atmospheres. If the water under the piston be evaporated under this pressure, it will have a temperature of about 291 degrees, and by its evaporation it will have raised the piston through a space of four feet; this will, therefore, be the mechanical effect arising from the immediate evaporation of the water. But when the evaporation has been completed, and the piston with its load of four atmospheres stands at four feet above the bottom of the cylinder, let the pressure, equal to that of one atmosphere, be removed from the piston. The remaining pressure of three atmospheres, being less than that of the steam below the piston, the piston will be raised, and will continue to rise until it has attained a height of five feet, and the steam thus expanded will fall to a temperature of 275 degrees, and its pressure reduced to that of three atmospheres, it will cease to rise. By this process a mechanical force, equal to the weight of three atmospheres raised one foot, has been obtained, in addition to the effect obtained from the immediate evaporation; but the expansive action does not stop here. Let the piston be relieved of the pressure of another atmosphere; the superior pressure of three atmospheres below the piston will cause it to rise to the height of seven and a half feet, the temperature of the steam falling to 250 degrees, and its pressure reduced to two atmospheres. A further mechanical effect, equivalent to the weight of two atmospheres raised two and a half feet high, has thus been obtained, and it is evident that, by constantly and gradually diminishing the load on the piston, an additional effect may

always be obtained from a given amount of evaporation, to an extent which is only limited by practical circumstances, which restrain the application of this expansive principle.

"Since the cost of producing steam, as a mechanical agent, depends on the quantity of fuel necessary to effect the evaporation of a given volume of water, it follows that all the effect obtained by this principle of expansion is so much power added to the steam without any expense. Its importance will be obvious in the economy of steam power."

In reply to this theory of expansion, as extracted from these works, I will say that the experience of engineers has never been able to realize the enormous gain which is claimed for it.

M. M. Regnault, in a set of experiments in regard to the nature and properties of steam, which were authorized by the French government, and recorded in the London and Edinburgh Philosophical Magazine for August, 1854, says:

"According to the views which I have adopted regarding the generation of power in machines moved by elastic fluids, the motive power produced by the expansion of any elastic fluid is always in proportion to the loss of heat undergone by this fluid in the part of the machine where the power is produced. I have labored to bring together the experimental data by which the theoretical motive power produced by a given elastic fluid which undergoes a certain change of volume, might be calculated; *unfortunately* these data are very numerous, and most of them can only be determined by extremely delicate and difficult experiments."

So that the statements of Mr. Bourne, before quoted, as to the notorious value of expansion, was not discovered by Mr. Regnault in these his "delicate and difficult experiments."

We shall now endeavor to show why the engineers of the present day do not obtain any of these economical results which are so positively claimed for expansion by the various authors aforementioned, such as Bourne, Lardner, etc. We will take the diagram which Mr. Bourne uses to illustrate expansion, and show from it that the losses that occur in the attempt to use steam expansively are more than is compensated by any gain thus obtained. In the first place the steam doubles its volume at half the pressure. For instance, if we take boiler steam at eighty-five pounds pressure, and expect to double its volume, we must add the atmosphere to it, which is fifteen pounds more; we then have a total pressure, atmosphere and all, of 100 pounds. Now, if we let 100 pounds represent the steam at the commencement of the stroke, and expand it four times, twenty-five pounds total pressure will represent the force at the end of the stroke when cutting off at one-quarter; now fifteen pounds have to be taken off, this being the atmospheric pressure, from the whole length of the stroke, and there are five pounds additional pressure to be subtracted, being the amount of force required to run the engine, so that there are twenty pounds to be deducted from the whole length of the stroke, and the final pressure in the cylinder, instead of being twenty-five pounds, exerts an effective force of only five pounds on the piston, at the end of the stroke, showing that the twenty pounds deducted from the first fifty squares, as represented in the diagram, would consume only ten squares

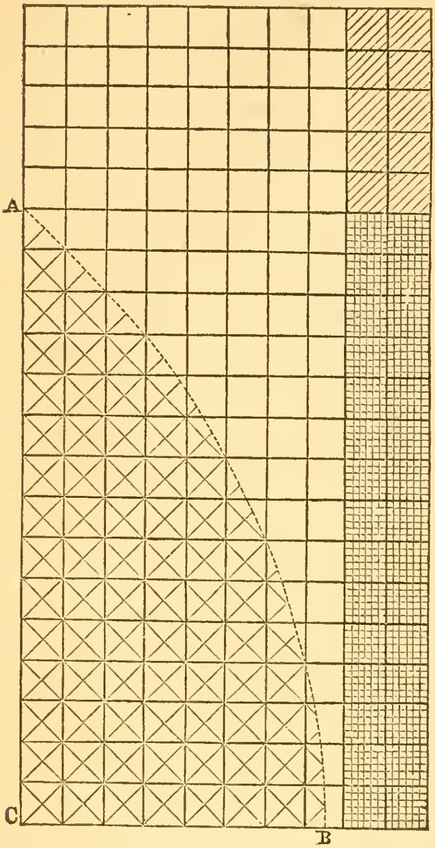
out of fifty, whereas it would use up thirty squares out of the sixty-eight gained by expansion.

Again, one foot of steam, at 100 pounds total pressure by expansion, falls short of four feet by twelve per cent. That is, there is not enough vapor of water in one foot of steam, at 100 pounds total pressure, to make four feet of steam at a pressure of twenty-five pounds. In order to realize the benefits of expansion, according to Mr. Bourne's theory, the cylinder and all parts of the engine, has to be made three or four times larger, and as all engines require a space between the piston and cylinder head, and also a steam passage at the cylinder head, which are denominated port and clearance, and in the North river steamboat engines that use puppet valves, the average of port and clearance is nearly ten per cent. Now, the larger the cylinder the greater is the amount of steam rendered ineffective in these passages.

Mr. D. K. Clark, the most accurate experimentor in regard to the use of steam expansively, in his work, The Physiology of the Locomotive, says that when a locomotive allows the steam to follow the piston three-quarters of the stroke, there is ten per cent. of water fed into the boiler unaccounted for by the volume of steam in the cylinder, as shown by indicator cards, and when the steam follows the piston only one-quarter of the stroke, there is thirty-five per cent. of feed water unaccounted for. In the expansion experiments at Erie, by order of the United States government, the amount of water unaccounted for by the indicator is forty per cent., when they were cutting off at one-quarter of the stroke. If we take the quantity of water unaccounted for by the indicator, and add it to the foregoing losses, it accounts for the failure to realize the slightest benefits by the use of steam expansively.

The want of any gain is clearly shown by the report of the Brooklyn pumping engines, used at the water works in that city, the report of which I have in my hands. The engine was made by Woodward & Beach of Hartford, Connecticut. They constructed some years since an engine for the Hartford water works, in which they attempted to cut off at one-eighth of the stroke, using steam at thirty-five pounds boiler pressure, and they were only able to raise forty millions of pounds of water one foot high with 100 pounds of coal. Whereas, in the Brooklyn engine, made by the same firm, by some unfortunate calculation in the construction of the engine, they were obliged to cut off at six-tenths of the stroke, and using a boiler pressure of only ten pounds, they were enabled to raise sixty million pounds of water one foot high with 100 pounds of coal, doing fifty per cent. more work with the same amount of fuel, by cutting off at six-tenths instead of one-eighth of the stroke, as the Hartford engine does, so that, notwithstanding Mr. Bourne's notorious effects gained by expansion, there is not on record one single fairly tried experiment which shows that there was anything made by the use of steam expansively, or by using any of those contrivances denominated variable, adjustable, automatic, gravitating expansion gear.

The following is a diagram showing a cylinder divided in its length n twenty, and its diameter into ten equal parts:



A, the point at which the steam is cut off; B, the pressure at the end of the stroke; the dotted lines show the hyperbolic curve; the lightly shaded squares the amount to be deducted when the steam is used at full pressure; the heavy shaded squares the force that is to be deducted after the steam is cut off; the very light shaded squares within A, B, C, represent the diminished effect when cutting off at one-quarter of the stroke.

The Chairman said there was a latent force in the steam unexpanded, which it appears is lost if the steam is allowed to follow the piston through its whole length as if it were a solid plug. How we could best take advantage of the expansive power was still an open question. It is singular that after the great number of experiments made there is so little known. A new series of experiments have been ordered by the government, and it would perhaps be better to postpone the further discussion of this question until after the results of the new experiments are known.

The subject selected for the next discussion was "Harbor Defence."

Adjourned. ENOS STEVENS, *Secretary pro tem.*

AMERICAN INSTITUTE POLYTECHNIC ASSOCIATION,
March 12, 1863.

The Chairman, S. D. TILLMAN, Esq., presiding.

The Chairman.—There is, probably, no better illustration of the undeveloped resources of the country, than in the immense business that has, within a few years, sprung up in the petroleum or oil trade.

The following is the trade of one city alone—Pittsburg:

To the oil district of the United States, the city of Pittsburg occupies a central position; her river navigation, that cheapest of transportation, reaches all the principal oil producing regions, and to Pittsburg the crude oil naturally came for a market. The necessity of refining the petroleum before it could be used for burning, led to the immediate demand for refineries. The low price of fuel at Pittsburg, and the cheapness of constructing the iron work necessary for their erection, caused them to be at once

erected here. Such are briefly the points in the history of the oil trade of this city. Three years ago, this trade in petroleum had no existence here. Its numerical value is now counted by millions. Three years ago, with an exceptional keg or barrel, gathered from whim or curiosity, from some of the Allegany oil springs, not a barrel of petroleum had been landed upon the wharves of Pittsburg. Within the last three years, it is estimated that not less than two millions of barrels have been delivered at the wharves of this city and its suburbs. At the average of the market rates that have prvailed during the three years, the value of the two million barrels of oil in its crude state would be about 8,000,000 dollars. Refined, its value would be, at the average of prices for refined oil for three years past, over 17,000,000 of dollars

Some indication of the extent of this trade will be obtained from the fact, that the shipments by railroad alone from the city, from October 1st 1862, to December 1st, or three months' time, were 60,514 barrels of crude oil, 88,921 barrels of refined, and 6,492 barrels of benzine, representing a value of 1,493,430 dollars for that quarter's oil exports alone.

Heavy as are these figures, they would have been yet larger, but from the difficulty of obtaining transportation, owing to the crowded condition of the railroads. This is better shown by the fact that, from the 2d of February up to the 14th, when additional rolling stock was placed upon the Pennsylvania Central railroad, there was shipped in those two weeks on that line over 46,000 barrels of crude and refined oil.

Three years ago, there was not a refinery of petroleum in Pittsburg; there are now sixty in the city and suburbs in active operation. The capital represented in the cost of their construction alone is over 1,000,000 of dollars. These 60 refineries gave employment to over 600 hands immediately employed in the works, whose wages will annually amount to upwards of 300,000 dollars. In addition, there is a large number of hands indirectly employed. The yearly amount of coal consumed by these 60 refineries will average 1,500,000 bushels. The indirect value of the oil trade, and its increase of employment and distribution of wages, is somewhat shown by this new consumption of fuel. To supply this fresh demand for coal, an additional working force in the collieries will be required, whose wages for the increased amount of coal to be dug, would, at customary rates, average about 30,000 dollars, and at present rates 40,000 dollars.

In three years the petroleum trade has caused the establishment here of one hundred new firms, a large proportion of whose parties were previously residents of other sections of the Union, and even of other countries. From France, from England, from Germany, from the New England States, from New York, have come men of means, men of talent, vigorous, sagacious business men, and made themselves homes amongst us. The value of the addition of so much fresh energy to our previously energetic and industrious population is not to be estimated. That it will show in future progress of our city, is not to be doubted.

The center of the oil producing districts, Pittsburg is naturally the chief refining city of the world, and must so continue. The same facilities that attracted the oil here, at the inception of the trade, will retain it. Petro-

leum naturally sought our city as its center and its metropolis. It has already swollen our business by millions, increased our population, made our city distinctive and prominent in the commerce of the world beyond our former importance, and created in the city of Pittsburg a business that in three years has from nothing become second only to our iron trade in extent.

I see Prof. Everett present, who has just returned from the oil region, and the club will no doubt be happy to hear from him on that subject.

Prof. Everett.—Having been unexpectedly called upon, I will endeavor to give the results of my observations while on a visit to the oil wells in the vicinity of Pittsburg. There have been about one thousand wells opened altogether. Many of these are now closed, as they have ceased flowing, and in many cases pumping them would not pay. They furnish from 600 to 1,200 barrels of the oil a day. There is evidently a great pressure of gas in the wells; in some instances the oil has been thrown from thirty to forty feet into the air, and this is, no doubt, the cause of the oil rushing up to the surface. There is always gas mixed with the oil as it comes from the well. There are wells that commence flowing at certain times of the day. I have seen one that flowed every day at twelve o'clock. This well had been flowing for several weeks before I saw it. The wells have been found mostly in sandstone formations. If it was not for the cost of transportation, the cost of the oil in this city would be much less. To transport the oil to market costs several times more than the oil itself. I have known it to cost three dollars to haul a barrel of it nine miles. Some wells give out and a new one, a few feet off, will give good oil. There can be no danger in refined oil when it is sent to market. The varieties of refined oil are greater than in the crude. Oil that will not burn from putting two or three lighted matches in it, can be said to be safe. This experiment should be tried in a saucer. I have not yet seen any lamps burn this oil without giving off the odor. The oil is now refined at the wells. Large quantities of the oil are brought to Pittsburg in square floating tanks. Great loss, however, has been occasioned at times, through coming in collision with each other, their bows being square, making it very difficult to steer them. The oil is refined in tanks, generally holding from twenty-five to fifty barrels, although at Pittsburg they have some tanks or stills that hold 300 barrels. The oil is refined by heat, mostly by steam; it has been found best for this purpose. Fifty pounds pressure of steam will take all the volatile matter from the crude oil.

Mr. Bull.—A friend of mine, a lawyer of this city, informs me that he has invented a lamp that will burn this oil without a chimney. He has invited me to examine it at his library, in University Place, where it is in use every evening. Not feeling myself competent to judge of this matter properly, I have not examined it.

Prof. Everett.—If there is perfect combustion there will be no smell.

Mr. Dibben.—I have examined all the lamps to burn oil without chimneys, that have been presented to the club for premiums, and I have not found one that produced perfect combustion. They were all failures in this respect. I will say that to make a lamp burn this oil without a chimney is impossible.

Mr. Rowell.—Oh, no, not impossible.

Mr. Dibben.—Yes sir, impossible.

Mr. Geo. Bartlett.—General Rosecrans, one of our most successful generals, tried various experiments in order to produce a lamp that would burn without a chimney, and he was not successful; he had to use a chimney some two inches high.

The regular subject for the evening, "Harbor Defence," was then taken up.

Mr. Geo. Bartlett.—When the question of harbor defence was agitated, some months since, there were various plans presented to the city; the most prominent of these was that of Commodore Vanderbilt, which consisted of sinking rafts at the narrow channels in the lower bay; the rafts were to be bolted together in a peculiar manner, so that they would have to be removed one by one, and sunk at the most narrow entrances; this plan met with much favor at the time.

The Chairman.—It was known that the governor had purchased a large quantity of timber for this purpose, and this no doubt was a very good plan for an emergency.

Mr. Geo. Bartlett.—I perceive that they are putting small cannon into the forts in the lower bay, while the experience of the past does not warrant the use of small caliber; their introduction in such places seems strange; the affair at New Orleans has fully demonstrated that small guns are useless in stopping even wooden vessels, and they are therefore of very little use in harbor defence; those I have seen are from 42 to 64-pounders.

Mr. Dibben.—The plan of Commodore Vanderbilt is a very practicable one as far as it goes; the sinking of bulkheads at the Narrows, with floating gates to be placed at narrow openings for the passage of small vessels, will answer very well; the rafts should be sunk so as not to be seen at low water; this will answer very well in keeping the enemy from coming up to the city by water, but at the same time we are blockading our own ports, and in that case we are half starved; this blockading the harbor is simply to put ourselves on short allowance. These rafts will have to be made very strong and fastened securely, so that they will stand the current, but it can be done. There is in the St. Lawrence river bulkheads similar to those proposed, and they stand the current of seven miles an hour very well, even in the depth of winter. But this plan protects only particular points, while others equally accessible are open to the enemy; a hostile army can land at the south side of Long Island and cross by land to the city; there are very good harbors in the lower bay, where a navy could anchor in safety. We have, therefore, Long Island and New Jersey to put in thorough defence, which would require time and a vast outlay. The best defence of the harbor, and which would overcome most of these difficulties, would be the construction of a ram, of great speed and strength; but a million and a half is not enough; this sum would go but a short way in building forts and mounting them with guns; how much more so then should rams cost, that answer the double purpose of a fort and a ram—a floating battery? a million of dollars is not enough, or near enough; if a ram was built to cost two and a half million dollars, that would have a speed of 25 miles an hour, it would sink the best navy in the world, and

a ship can be built to do this as sure as you can fire a shot through a pine board. Mr. Stevens has said he can build a vessel that will bear the test guns of the navy, and there are no better guns than in our own navy, and he says this vessel will have a speed of 20 miles an hour, and he offers her to the government on these conditions, and if she is not shot proof and of this speed, the government need not take her, and he will be at the loss of building her; this is indeed a very liberal offer. Mr. Stevens has made numerous experiments to satisfy himself that this ship can grapple with any in the world, but the mounting of his guns in barbette frightened the committee who examined it, and they reported against the purchase of her by the government. Mr. Stevens places very little dependence on his guns, but mainly on the use of this ship as a ram; the use of port holes, he said, would so weaken her sides, that he could not warrant her impenetrable; the loading of the guns was from below and by steam power. It can be made one-third stronger by having no ports. The practice we have had at the South fully illustrates the utility of rams; give the Monitor a speed of 12 miles an hour, and she would sink every vessel to be met with south. The Merrimac had only five miles an hour, and therefore she could not do much as a ram; there can be no possibility of one ship overcoming another that has superior speed. Take the little steamboat Frank, on the North river, and even as she is now, I will venture to say she will sink some of our large steamboats by her superior speed and manœuvering; show me a boat of five miles an hour, and give me one of ten, and I will sink it. Mr. Stevens has had an engine in his boat some eight years, capable of giving it a speed of 20 miles an hour, and from his long experience in such matters, I say he understands more of this subject than any one in New York, for he has made some thousands of experiments, and could give very valuable information to the harbor defence committee.

Mr. Geo. Bartlett.—In illustration of Mr. Dibben's remarks, I may mention the case of the steamer "Winfield Scott," which, on coming into her dock at Aspinwall, her commander, desirous of showing off, ran his vessel at considerable speed into the dock, and the ship struck against the pier and went twelve feet into the timbers and through other mason work, and the vessel was but little damaged, and the shock was but little felt on board.

Mr. Dibben.—I saw the steamship Atlantic, at the foot of Charlton street, strike against the pier, which was newly made and filled in with stone, and she cut through the timbers and stone work for some twenty-five feet, and the engineer did not know that anything extra had happened. The Atlantic is solid wood for thirty-two feet in the bow; if this bow was braced with iron and a speed of twenty miles an hour attained, she would go through the Warrior, and come out the other side.

Mr. Geo. Bartlett.—Mr. Webb is now building an immense ram 350 feet long, and 60 feet beam, of solid oak nine inches thick, with a long massive nose; it is to have a speed of sixteen miles an hour, and to be propelled by one screw.

The subject of "Petroleum" was chosen for the next meeting.

Adjourned. JOHN W. CHAMBERS, *Secretary pro tem.*

AMERICAN INSTITUTE POLYTECHNIC ASSOCIATION,
March 19, 1863.

The Chairman, S. D. TILLMAN, Esq., presiding.

Dr. Gould presented a model of his combined lap-joint railroad track, to prevent the jamming and bending of the ends of the rail, which elicited considerable discussion.

It had been tested, he said, for four and a half years on the Erie railroad, and during that time did not cost six cents for repairs. The expense of making the joints, at first, cost from twenty to thirty dollars, but they can now be made for ten to twenty cents. The explanation of the rail is, that by a peculiar lap the joint is made equal to the solid part of the rail, and there is therefore no bending from the weight of the train, as is now the case with the common rail, and the rail is just as level at the joint as at any other part. The patentable part of this rail is the joint and the process of making the joint. It is so constructed that dirt or any other substance that may get in between the joint, will be crushed or made to fall out by the action of the train passing over it. The bending of the rail at the end of the bar from the weight of the train, and the consequent elevation of the rail before it, and the wheel striking the elevated rail, cause the jarring so disagreeable in railroad traveling. He had noticed the injurious effect this jarring had on cattle that were transported a long distance by railroad, and he made inquiries of the drovers and brokers, and was told by them that cattle brought to this city, as a general thing, were transported 1,000 miles, and when they arrived here they were in a state of fever, produced, in his opinion, by the jolting on the cars. On arriving at Buffalo, he was told that their plan of feeding the cattle was to place heaps of hay around the edge of the lake, but, without tasting a particle of food, the animals would invariably take to the water, and this was because they were in a high state of fever; and as fever has a tendency to swell the outer tissues, and make the blood flow to the surface, which, in their case, swells the legs without swelling the hoofs, causing them intense pain, they seek relief by plunging into the water.

He was told by the drovers that it would not be profitable to give the animals time to rest before selling them, as they declined in flesh rapidly for a month after their arrival in this city, and it would require this length of time before they would commence to gain in flesh. In this case they follow the same law of a man with typhus fever, as he will gradually decline in flesh for a month after the fever. There is a marked difference in the flavor of beef killed on a farm, and that which is brought such a great distance in cars to this city. The flavor of the former, when either broiling or roasting, could be smelt for nearly half a mile.

Mr. Dibben said that, in regard to the injurious effects of the jolting of the cars on cattle, it was remarkable that on the rails of the bolted or continuous pattern, that have no ends to bend down, this jolting has been felt more than on the rails of the common style. The fact that Dr. Gould's rail was in use four and a half years without any repairs, spoke in its favor, but if it was laid some 100 miles instead of twenty rods, we could set more value on its utility.

Mr. Rowell said he noticed on a railroad he recently traveled on in Con-

necticut, that to avoid this bending and jarring at the ends of the rails, they placed the end of the rail a little above the one that followed it.

Mr. Bull read an extract from a Boston paper, giving an account of the diameters of the telescopes in the various observatories.

The largest object glasses hitherto made for a telescope are those of the observatories at Pulkova, in Russia, and at Cambridge, in Massachusetts. These have an aperture of something less than sixteen inches, and a focus of twenty-one feet, but the available apertures are considerably less. The observatories at Ann Arbor, Michigan, and Cincinnati, have telescopes whose apertures are only twelve and a half and twelve and three-quarter inches. That of the National Observatory, in Washington, has only nine and a half inches. Mr. Alvan Clark, of Boston, long known as one of the best makers in the world, has succeeded in making a glass which gives an available aperture of eighteen inches and a half.

The Chairman said that Prof. Draper, of the New York University, has made a telescopic reflector of silvered glass, which was considered a success. The usual mode is to make them of metal. It was at his residence at Hastings.

Mr. Parmelee said he deemed it proper to call attention to an article that was now manufacturing to a very large extent for the purpose of being sent to the army during the summer, and that was a new beer cooler. The point to which he wished to call attention was the use of lead pipes, without being tinned on the inside. Now, it is evident to any one at all acquainted with the subject, that the use of lead pipe for this purpose was calculated to produce injurious effects. The use of lead pipes for liquids, such as beer, was very reprehensible. The excuse for not using tinned pipes was that there was no danger, as the pipes were washed out every day. The cooling is done in the usual way, by the beer passing through coils of this pipe. They are got up in very neat style, silver mounted and well made throughout.

Mr. Rowell, in answer to some inquiries at the last meeting, drew a diagram on the blackboard, to illustrate experiments made at the Metropolitan Mills to test the utility of the cut off in steam engines. An engine, the cylinder of which was fourteen inches diameter; a sleeve or inside cylinder was made to fit into this, so that it was reduced to half its former area of piston, and both engines were tried successively; with the fourteen inch cylinder the steam was used with the cut off, or expansively, but when used with the inside cylinder there was no cut off used, but the steam was used to end of the stroke; and after repeated experiments, the preference was given to the small cylinder, using steam to the end.

The Chairman said that Mr. Rowell's argument favored the use of small cylinders, when it was well known that the friction of a piston increased as diameter, and the pressure increased as the square of the diameter. The use of large cylinders would, therefore, relatively decrease the friction.

The subject of "Rock Oil" was resumed.

Prof. Everett said that Oil creek was 135 miles above Pittsburg, and was navigated part of the year by steamboats, and at other times the upper part was navigable by flat boats. The oil was first obtained by boring from two to three hundred feet, but he had seen one well that was found at

seventy feet, pumping seventy barrels a day. When the flowing wells failed they resorted to pumping, but less oil was obtained than when the well was a flowing one. The flowing wells have mostly given out, and pumping ones most in use; and now the average yield has greatly decreased. The question of these wells continuing their supply is one of great importance, but generally as one well gives out another is found to supply its place; but even if they all should fail the wells of Canada could be made available, and would be sufficient to keep up the supply for an indefinite period, so that there was not much danger of our returning to coal for light.

The process of refining the crude oil is simply by heating it and collecting the vapor as it passes off through the still; it is then treated with acid, and afterwards with alkalies in the usual way to remove the acid. Flowing wells he could not account for; he had seen one owned by the Lockport company, that flowed for fifteen minutes, and stopped for some time, and then commenced flowing again. Some wells appear to give out by the gas becoming exhausted; he thought the supply of these wells was below and not in the mountains; drills weighing some 600 or 700 pounds was thrown out by the force of the gas. The well that gave out periodically, flowed at full force when it commenced again. It is probable that when this well stopped flowing the gas became exhausted, and it ceased until sufficient had accumulated to give pressure enough to force up the oil; the gas that flowed up with the oil was carburetted hydrogen. There is a difference in the vapor of the gas and the vapor of the oil. The amount of oil the wells give in twenty four hours varies very much, some giving from 300 to 400 barrels a day, while there are others that yield 900 barrels of the oil with 300 barrels of water with it a day. The temperature of the wells he tested was seventy degrees, or about the temperature of the atmosphere at the time.

Mr. Churchill inquired whether the gas continued to escape during the intervals in the flowing of the oil.

Prof. Everett said that it did, and when the oil stopped flowing, the gas continued.

Mr. Pratt said that flowing wells were first discovered in the Buchanan district, and flowing wells have since been discovered up the creek; the large ones were first found below it. The last large well was some six or seven miles from Titusville. The greatest flow he had heard of was the Empire well, which was said to give 1,800 barrels a day, but this was only for a short period; it gradually grew less, and last November decreased to some 300 to 500 barrels, and then stopped very suddenly. The company had just made a contract for 10,000 barrels, and had made arrangements to fill it by fitting up pipes, &c., and had just three barrels in when it failed; it is now giving some 300 barrels a day by pumping; it appears that the pumps agitate the well, when the oil seems to be forced up. The Phillips' flowing well gives some 600 barrels a day of yellow oil; this is what is known as oil with the water in it. This yellow oil flowed from all the wells in the vicinity at the time. A curious fact connected with this well was, that when another well was discovered near it, the supply of the first one was greatly diminished, and on plugging up one the other ceased to flow, and

when the plug was removed the flow commenced again. There is very little difference in the specific gravity of the oils; the heavy ones that are in market are the result of distillation, that which flows from the wells is from forty-two to forty-nine, scale of Baumé; there are wells near the Allegany, the oil of which is from thirty-two to forty specific gravity. The new well that was discovered some ten days ago, gives a yellow oil; they then changed the tube and the oil came up mixed with water, which they could not separate except by heating; the tube was changed from one to three inches in diameter.

Mr. Bull inquired how long a well continued to flow.

Mr. Pratt said for about eight months; the average life of a flowing well is eight months, and continually decreasing; that was the case with the large wells, but some of the small ones commenced small and increased fourfold. The Buckeye well gave at first 1,000 barrels for ten months, and gradually came down to something like a pipe stem, and they are now putting a pump down. The supply now of the different wells he would judge to be about 5,000 barrels a day to some 18,000 about eight months ago. Wells have been bored down to 400 feet, and had to be abandoned for want of means to go further, and there have been cases of wells ceasing to flow as they have gone down further. The Empire was some fifteen to twenty feet lower than the Buckeye. The shafts were all sunk perpendicularly.

Mr. J. H. Churchill said the result attributed by Mr. Pratt to the influence of water, was the change of color, which was only removed by distillation diffused from the effect produced by water when intimately mixed, as he has seen it in some cases with refined oil. In this instance steam was condensed in the oil and produced a milkiness throughout it, but in the course of a day or two, with rest only, it completely separated.

Mr. Pratt said the milky appearance in refined oil was owing to the acid not being all removed; in refining, the best results have been obtained with sulphuric acid in removing the odor, and the acid afterwards removed by an alkali.

Mr. Grieves said that muriatic acid would be used but for its greater cost, as it was a better deodorizer than sulphuric acid.

Prof. Everett.—Sulphuric acid answered the purpose very well; the cost between the two acids was only some three cents a pound.

Mr. Pratt said the size of the boring for the oil is from three to four inches in diameter; in boring, the drill has at times dropped suddenly from four to five inches.

The Chairman said that a most remarkable fact connected with the oil wells was that the lighter particles of the oil, which some few months ago were considered as worthless, have now become very valuable, owing to their use as a substitute for turpentine.

Mr. Parmelee read a few extracts from the patents of Mr. E. Fall, of Brookline, Mass., on his manner of treating bichute, in which he speaks of using carbon spirits; he wished to inquire if there was anything known in commerce as carbon spirits.

Prof. Everett said it is possible that he refers to the lighter oils, such as benzole. What is known as benzine, naphtha and benzole, are all substantially the same; they only differ in the temperature at which they are

allowed to pass from the stills, some being taken off at a higher temperature than others, and to these various names are given; indeed it is a matter of choice with those who send it to market, whether they make it benzole, benzine, or any other name by which the lighter oils are known. There is nothing known in commerce as carbon spirits.

Mr. Rowell read an extract from a paper relating to the oil wells of Canada, which were about being revived, from which it appeared that the average yield of the Canada wells was about 1,000 barrels a day.

The Chairman said that in all the oils there was an excess of carbon, and they therefore would not burn without smoking. The formulæ for some illuminating compounds are as follows: Olifiant gas 4 C_4 H; oil gas 8 C_8 H; spermaceti 32 C_{32} H. These substances burn without smoke. It will be perceived that there is an equal number of atoms of carbon and hydrogen in each; but in substances which give a brilliant flame, yet are liable to smoke, there is always an excess of carbon atoms. Thus camphene or purified turpentine contains 20 C to 16 H., and in all the rock oils there is an excess of carbon. The proportions of carbon and hydrogen have not been determined by the chemists.

A New Alarm.

Prof. Vanderweyde presented a model of a new burglar alarm; it consists of two gas burners, one above the other, about eight inches apart; between these burners there is a tube about an inch and a half diameter, and seven inches long, the upper burner to be kept lighted during the night; an attachment is made from the lower burner to the door or window, which, on being opened, causes the gas to escape from the lower burner, and ascending through the pipe to lighted jets above, gives rise to a series of explosions, say some 50 in a second, by which a noise similar to a steam whistle is produced, the tone of which can be varied according to the size of the pipe or tube between each jet. He tried the experiment with a stovepipe, and the noise was equal to the roar of a lion. It could also be used as a fog signal and various other purposes. It is constructed on the principle of the chemical harmonica.

The Chairman said the instrument called the chemical harmonica was long known, but never before applied to any practical purpose; he was glad to see that Prof. Vanderweyde had made a valuable application of science to the arts.

Prof. Vanderweyde, in reply to an inquiry, said he had made several experiments to destroy the odor in the oils, but thus far had not fully succeeded.

The subject of "Petroleum" was continued for the next evening.

Adjourned John W. Chambers, *Secretary.*

American Institute Polytechnic Association,
March 26, 1863.

The Chairman, S. D. Tillman, Esq., presiding.

Mr. Bull.—Mr. Chairman, some few weeks ago we had some interesting experiments before us, exhibiting a new system of ventilation, and in connection with this subject, and merely as a matter of interest during the hour devoted to miscellaneous business, I will read an extract somewhat relating to that subject, as follows:

"VENTILATION.

"The French Academy of Sciences, at a late meeting, listened to a paper from M. Delbruck, which, if well founded, will upset a good many of our existing notions about ventilation. Mr. Delbruck has made some researches on the quantity of air required for breathing during sleep. It strikes him as singular that, while all medical men are unanimous in prescribing several cubic meters of pure air for each person sleeping in a room, as absolutely indispensable for health, all animals appear to shun the open air as much as possible, in order to compose themselves to sleep. Thus, the lion and tiger retire to some dark cavern, where the air is confined; the dog goes to his kennel and thrusts his snout under his belly; birds, to which the open air would appear to be a necessity, whether asleep or awake, retire to some private corner, and put their heads under their wings. Nay, what does the schoolboy do when left in a dormitory aired with particular care? If he finds he cannot fall asleep, the first thing he does is to bury his head under the bed-clothes. Hence, M. Delbruck concludes that if, when awake, we exhale a quantity of carbonic acid, we must inhale a certain quantity of this gas during sleep, just as plants exhale by day the oxygen they absorb during the night."

Mr. Rowell.—I have read of experiments where a sparrow lived in a cubic foot of air for three hours, but if taken out after being in one hour, and then placed in again, it would die in a few minutes.

The Theory of the Wave.

Mr. Bull read the following extract on the theory of the wave:

"The velocity of waves has relation to their magnitude. Some large waves proceed at the rate of from thirty to forty miles an hour. It is a vulgar belief that the water itself advances with the speed of the wave; but in fact the form only advances, while the substance, except a little spray above, remains rising and falling in the same place, according to the laws of the pendulum. A wave of water in this respect is exactly imitated by the wave running along a stretched rope when one end of it is shaken; or by the mimic waves of our theaters, which are generally the undulations of long pieces of carpet, moved by attendants. But when a wave reaches a shallow bank or beach, the water becomes really progressive, because then, as it cannot sink directly downwards, it falls over and forwards, seeking its level. So awful is the spectacle of a storm at sea, that it is generally viewed through a medium which biases the judgment, and lofty as waves really are, imagination makes them loftier still. No wave rises more than ten feet above the ordinary level, which, with the ten feet that its surface afterwards descends below this, gives twenty feet

for the whole height from the bottom of any water valley to the summit. This proposition is easily proved by trying the height upon a ship's mast, at which the horizon is always in sight over the tops of the waves, allowance being made for accidental inclinations of the vessel, and for her sinking in the water to much below the water line at the instant when she reaches the bottom of the hollow between two waves. The spray of the sea, driven along by the violence of the wind, is of course much higher than the summit of the liquid wave; and a wave coming against an obstacle, may dash to almost any elevation above it. At the Eddystone light-house, when a surge reaches it which has been growing under a storm all the way across the Atlantic, it dashes even over the lantern at the summit."

The Chairman.—I will remark, in relation to this subject, that Dr. Scoresby, who studied this matter very thoroughly, made observations from a vessel at sea during a great storm, and he found that the largest waves were some twenty-five feet high and six hundred feet long.

Dr. Stevens.—Several years ago I crossed the Atlantic, and one day, while in the longitude of the Azores, in the midst of a violent storm, a large East Indiaman, a vessel of the first class of that day, came drifting along, and lay in the trough of the sea, while we lay in another. When the storm appeared at its highest, it suddenly ceased, and I then had an opportunity of observing the motion of the East Indiaman, which at times was entirely out of sight, even from the main top mast of our vessel. The waves stretched as far as the eye could reach, and it appeared to me to be the same identical wave that followed us from Sandy Hook.

Mr. Bull read a statistical account of the railroad and ferry travel of this city, for the past year. After which, he presented an oil lamp to burn without a chimney, of which he spoke at a previous meeting. The lamp was lighted and appeared to burn as bright and free from smoke as could be expected; there was nothing new claimed for it, and it was only exhibited as showing the above mentioned qualities. The burner was made by Mr. Miller of 211 Centre street.

Mr. Page.—I have some twenty-five different burners that have been got up for this purpose. There has been a great amount of time, labor, and money lost, by persons getting up these burners not fully understanding what is essential to make a good burner. If they would acquaint themselves with the theory of combustion and the composition of the different oils, the dissimilarity between petroleum and coal oil, there would be less failures in this respect. There have, however, been wonders done thus far, as those who know what the oil is can appreciate; the improvements that have been made are bringing the oil into very general use, particularly on steamboats and railroads. I have experimented very largely with nearly all the burners that have been introduced, and tested their illuminating qualities with the photometer.

At the suggestion of a member, Mr. Page said he would exhibit several burners, and show the difference in their illuminating properties, at the meeting of April 9th.

Smith's Ram Torpedo.

Mr. E. F. Smith, Jr., presented a drawing of his ram torpedo, for destroying ships by exploding shells within the ships. No vessel, he said, could be made to withstand the shock of fifty pounds of powder exploded under her side. The torpedo consists of a tube into which a sliding rod is fitted, and placed in the bow of the vessel; on the end of this rod a wedge shaped shell is fastened. When the ship to be destroyed is approached to within some twenty-five feet, this rod is made to eject with great force, by machinery, from the bow of the ram, and enter the ship, and immediately explode the shell; when the rod is withdrawn and another shell attached to it, when it is again ready for another trial. It might be said, in this case, that he would be hoisted by his own petard; but it is the opinion, Mr. Smith said, of eminent engineers, that twenty feet distance from this shell his vessel would be entirely safe.

Mr. Bull.—I was present, several years ago, when Mr. Colt made an experiment in blowing up an old vessel, provided for that purpose, off the Battery. The vessel, at the appointed time, was blown to pieces, and the fragments lay scattered on the water around. I am happy to recall the fact that this vessel was furnished and paid for by the American Institute.

Mr. C. Pepper.—Mr. Chairman, I have made experiments, and discovered that by placing silicious sand in steam boilers an increased amount of steam resulted therefrom. It has been tried on a locomotive, and the experiment showed that with the sand in the boiler more steam was produced, and with less consumption of fuel than could be obtained from the same boiler formerly. I would therefore like to have this subject brought before the Club at some future meeting.

The Chairman.—This subject could be introduced when steam boilers are under discussion. "Steam Boilers" was, on motion of Mr. Dibben, selected as the question for discussion at the meeting of April 9th.

The subject for the evening, "Petroleum," was then taken up.

Dr. R. P. Stevens delivered a very interesting lecture on "The Coal Formation of the United States," which he illustrated by drawings, exhibiting the sandstone, conglomerate and shales alternating with beds of coal, etc. The immense coal field commencing at the Delaware river in New York, and extending through Pennsylvania into Ohio, westward, and Alabama on the southwest, contains more than one million of million tons of bituminous coal, and covers more than one hundred thousand square miles, with an average thickness of forty feet, under which lies our present oil wells. The theory is, that these wells are the drainings of the bituminous coal above, and we are now pumping it up. The depth of these wells, at the mouth of Oil creek, in Pennsylvania, is 800 feet. The coal of Pennsylvania lies in one immense basin, 2,500 feet above the level of the sea, north and south, and sinking down to 800 or 900 feet below Pittsburg. There are wells from which salt water and oil are taken, and one of these wells is only thirty miles from Pittsburg. Anthracite coal contains no bitumen, therefore oil wells are not found in its neighborhood. In relation to Hunt's theory, it is sufficient to state that there has been enough oil pumped out of Pennsylvania to equal all the limestone in the State of New York.

It would be unintelligible to report this lecture at length without the aid of the drawings, to which Dr. Stevens made constant reference.

The Chairman.—We have now arrived at the foundation of this vast subject. An immense field remains to be explored, and, after what we have just heard, it is needless for me to say that I know of no one who better understands this subject, in all its bearings, and is more capable of doing it justice than Dr. Stevens.

Mr. Grieves.—Mr. Chairman, at the last meeting, Prof. Everett stated that naptha and benzine were the same. In this opinion I differ, and hope to be able to show their different atomical constituents if time would allow this evening. I know that to separate the constituents of petroleum is very difficult and requires great care, and that no two chemists will arrive at precisely the same results. There are over fifty different processes for refining the oils ; and as the oils differ in different localities, they should also be treated with different chemicals. As time will not allow this evening, I will not enter further on this subject, but reserve for another occasion the reasons that lead me to form this opinion. I have noticed that there has been discovered recently a substance called sedillon, and which is said to be superior to coal gas for illuminating purposes, and that it is taken from petroleum, but I have found it is nothing more than carbon and carbonic oxyd. There is great variation in petroleum hydrometically, as well as in the particles composing it. In one specimen the hydrometer will show a certain density, while in another a marked difference will be observed. Respecting the inquiry made at the last meeting by Mr. Palmer as to what is carbon spirits, I have since learned that an article known by that name is sometimes sold here ; it is properly eupione, the specific gravity of which is .074. A mixture of naphtha, alcohol, spirits of turpentine, and sometimes benzine, goes by that name. It was first got up for illuminating purposes, but was unsuccessful, as it ignites at 80 degrees. That which is sold here as naphtha is a mixture of benzine, naphtha and eupione ; it has a worse smell than the odor of the polecat.

After some debate the subject of "Petroleum" was continued for the next evening, to allow Mr. Grieves to enter more fully on the subject.

The Chairman.—As the term naphtha has been used very much in this discussion, it may be proper to state that naphtha is a product of distillation, not homogeneous; it is composed of many substances. I have seen benzine and naphtha used for the same purpose. Petroleum is a mixture of a series of hydro carbons, and as they have not yet been separated, and our knowledge of their constituents is exceedingly limited, anything relating to them will be of great interest.

Adjourned to Thursday evening, April 22d.

John W. Chambers, *Secretary pro tem.*

American Institute Polytechnic Association,
April 2, 1863.

The Chairman, S. D. Tillman, Esq., presiding.

Mr. Bull read an extract from a paper giving an account of

The Sewers of Paris.

"The first vaulted sewer in Paris was constructed as early as 1374; but so slow was the progress of the improvement that the last uncovered sewer only disappeared ten years ago. The present system of sewerage was decreed on the 26th of March, 1852, and consists of six main galleries, called collectors; fifteen secondary ones opening into the former, and themselves fed by a vast number of smaller ones intersecting the city in every direction.

"The smallest sewer is some seven feet in height, by four in breadth, and the largest about thirteen feet in height and seventeen in breadth. The former is of an ovoid shape, and affords ample space for a man and a wheelbarrow. The largest sewer is divided into three parts, the two lateral ones forming foot pavements and the middle one a gutter or drain some four feet broad. On each foot pavement a series of iron posts support a water-pipe, varying in diameter from three and a half to two feet. In some of the galleries there is but one water pipe. To cleanse the drain a small cart running on iron rails laid along the bottom is pushed forward by two men; the front of this cart is provided with a drop-plank, acting like a sort of sluice, which, when down, exactly closes the section of the gutter, and pushes all the mud before it as the cart advances.

"But the grandest feature of this sewerage system is a syphon by which the foul waters of a large part of the city are carried under the bed of the Seine to a proper outlet. This syphon is an enormous pipe of wrought iron, having an interior diameter of three and a third feet, and some seven hundred feet in length, which is sunk seven feet below the low-water mark. The general collector, into which all the secondary ones pour their floods, is a stupendous work, and probably without a parallel in the world. It is sixteen feet in height by eighteen in breadth, with a length of about eighteen thousand and forty-five feet in nearly a right line. The foot pavements in this immense subterranean avenue are some six feet, the central drain is nearly eleven feet in breadth, with a depth of five feet; so large, in fact, that a well-sized boat is kept afloat on it for the purpose of cleansing. Four boats in all are constantly employed in this work, and it takes sixteen days to cleanse the whole length. Ventilation is provided for by air-traps at certain distances, and the gallery is lighted with oil lamps.

"The execution of this immense system of sewers has cost fifty millions of francs ($10,000,000). The grand gallery is larger than the famous Cloaca Maxima of Rome, while the style of construction is of course vastly in advance of the Roman work. The Cloaca Maxima is over thirty feet in height, but is only thirteen feet broad, and is supposed never to have exceeded a length of three thousand feet."

The Chairman.—In connection with the subject of sewers, I may state that one of the largest sewers in the world is now building in London. The city of New York, owing to its natural advantages, does not require

any vast system of drainage; in this respect we are better situated than any other city in the world. I have received a note from Mr. Grieves, who was to speak on the subject of petroleum, stating that he cannot be present this evening. I will, therefore, call upon Mr. Calvin Pepper for some remarks on his method of using sand in steam boilers.

Mr. C. Pepper.—The subject on which I propose to speak has some connection with the one before us, petroleum. Some two years since I procured a patent for burning gas in combination with sand, but in the course of my experiments I found that by introducing the gas into the sand I obtained the best results, and I then had my patent to cover all methods of burning sand; the thought then suggested itself to me, that by placing the sand within the boiler I could heat the water much better than by any other method. I found that the sand kept the heat longer than the water, and my experiments to show that by putting the sand into the boiler was the best application of the laws of heat. I have tried it on a locomotive, and it is now in use in Albany. I have it also in a boiler of a stationary engine, and have experimented with it before scientific judges. I have found that by using sand any of the inflamable fluids, such as kerosene, benzole and naphtha, can be burned as fuel without smoke, and that crude petroleum can be also burned as a liquid, or as a vapor, and this too without smoke, and as fuel in the form of flame, and this form I found to be the best heating medium. When I burned street gas, the pressure from the gasometer, and the air which the sand absorbed, was sufficient to burn ordinary carburetted hydrogen without smoke, and in burning camphene and burning fluid, I did not get an entire absence of smoke without using a blow pipe. I have burned one of the coarser oils of a specific gravity of 45° without smoke. I claim that sand does not only generate steam much quicker, but that it is a preserver of the boiler; the sand does not become concrete or secrete any matter, or combine with the water to form solids, but I have found it to act as a filter.

The Chairman.—As Mr. Pepper's remarks appear to embrace several subjects, it would be well to select some particular one and confine ourselves to it; as there are several engineers present, the subject of using sand in steam boilers would no doubt be most interesting.

Mr. Pepper.—I am aware of sand being used for heating purposes in London, and also of gas being burned by passing it through bricks. The steward of the Metropolitan Hotel, in this city, saw experiments tried in burning gas in bricks and sand, and the preference was given to the sand.

Mr. Bartlett.—In discussing this subject we would facilitate matters greatly if we knew some of the results attained thus far. It appears that several experiments have been made, and as the subject is calculated to elicit inquiry, I would ask Mr. Pepper if he can give us the results of any one of the experiments.

Mr. Pepper.—The experiments of which I spoke have been published. I have since made others, and I came to this city to continue them. I am entering into arrangements for trying various experiments during the coming week; and as I did not think this subject would come up this evening, I have not come with the datas and other particulars, but hope at the

next meeting to give the results of my present experiments. I am about applying this principle of using sand for heating water for warming schools. If my theory is right I should be able to boil water much quicker than with the ordinary method. For the last nine months, all the water of which my tea and coffee is made, is heated with sand. The sand is not only in the kettle, but in the coffee and tea pot, and I find that by placing the sand in the tea and coffee pot, the water keeps hot much longer. If two vessels filled with water, in one of which sand is placed, and both exposed to the sun on a warm summer's day, the vessel in which the sand is placed will be much the coolest. I find that sand in boiling water is at a higher temperature than 212 degrees, and ebullition takes place quicker. For this reason it is essential that the sand should be placed nearest to the fire. Water with sand in it, after being heated, takes longer to cool. At the Delavan House, at Albany, where I live, vegetables and meats are cooked much quicker by my process. In using sand in locomotive and stationary boilers, I have never found the sand to be carried over into the cylinder or other parts of the engine. On the Troy and Saratoga railroad I have sand in the boiler of one of the locomotives. It is placed upon the crown sheet, in forty-nine boxes covered with wire gauze, and I have evidence of its entire success. The Central railroad has authorized me to test it on their locomotives. In a very few days I will have it tested in warming buildings. My object in coming to this club is to get further information; and I desire a thorough investigation, and if I am in error I will freely acknowledge it, and feel indebted for any light that may be thrown upon it. The talent displayed at the last meeting in discussing the subject of "Petroleum," convinces me that my discovery is in able hands.

Mr. Parmelee.—The best mode of generating steam is one that has occupied inventors to a very large extent; every possible form of boiler has been experimented on, and it appears to me that the subject, in this direction, is well nigh exhausted. I believe any further improvement will be found in a better system of insulation, on the principle that you cannot get more from a cat than her skin. I cannot see how any more than a certain quantity of steam can be got from a stated amount of heat, but we can prevent much of that heat being lost by radiation; and here, I believe, is the point to look for improvement in steam boilers.

Mr. Bartlett.—Some of the arguments advanced here impress us as being absurd at first sight. Sand cannot give out more heat than it receives, and it appears that the experiments of Mr. Pepper do not confirm his theory. Sand has very little capacity for heat—less than water; it will therefore be first to give off heat to the water, but it cannot give more than it receives. There are a great many elements to be observed in these experiments. If there is the least difference in the heating surface of one boiler from another, or any smoke, or other non-conductor, either on the roof of the fire box or in the crown sheet in the boiler, there will be a very perceptible difference in the generation of steam.

Mr. Joseph Dixon.—I did not hear the commencement of Mr. Pepper's remarks, but what I have heard would lead me to inquire, if by using sand the same quantity of fuel will evaporate more water than without the sand?

Mr. Pepper.—Yes, sir; I could claim nothing new if it did not.

Mr. Dixon.—Then you assume that a small quantity of sand placed in the boiler generates more steam than without it. Now, how much less fuel will it require to generate the same amount of steam that was obtained without using the sand? If a small quantity of sand does well, would not a greater quantity do more?

Mr. Pepper.—There is a certain limit to the use of sand, as well as in the thickness of metal in steam boilers.

Mr. Dixon.—I have seen years ago many experiments tried in steam boilers, and have myself done something in this line. I remember one that was tried in Boston harbor. The inventor saw a hatter at work, and observed that the wheel used by the hatter, which revolved in hot water with great rapidity, filled the room with steam; he, therefore, contrived a brush to revolve in the water within the boiler and scatter the water in a spray on the sides of the boiler. The boat was built some sixty feet long, and the boiler was about twelve feet diameter. The steam was got up very quick and the wheels made a few revolutions and then began to gradually decline in speed, for there was not heat enough to evaporate the water; and this experiment failed from the want of a right proportion of water and heat. Now, if putting sand in the boiler will generate more steam, or in other words, give more heat, I will have to unlearn a little of my past experience.

Mr. Pepper.—If I am enabled to generate steam with the sand quicker than without it, but at the same time use more fuel, my discovery is of no avail; but there is no increase of heat, but merely the addition of the sand makes an increased amount of heating surface, which, together with the property of the sand not absorbing the heat, accomplishes all I have stated. The least deposit of sediment or dirt will interfere with the generation of steam very perceptibly. I have noticed in my experiments that a very small per centage of sediment or calcareous deposit will interfere very much with the conducting power of the iron, and render much of the heat ineffective. I have tried other substances in place of sand, but could find none to answer as well. I have driven a large stationary engine with sand heated by gas.

Mr. Bull.—What do you consider the maximum and minimum quantity of sand in a boiler?

Mr. Pepper.—I have used the minimum quantity thus far. I have never yet used too much. The quantity varies with the size of the boiler. I would apportion the sand according to circumstances. When I used a pint of sand to a pint of water I have not found it to be in excess.

Mr. Bartlett.—I think it important, if we can demonstrate that, by using sand, crude petroleum could be burned as fuel in generating steam. Mr. Pepper says he has done this, but he had to use the blow-pipe to force in the air to avoid smoking; if the air is all that is in the way, it can easily be remedied.

Mr. Bull.—I would like to inquire if there are any stoves made to burn petroleum?

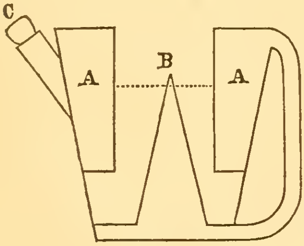
Mr. Chambers.—There is a stove constructed for burning petroleum, and now in use at the corner of the Bowery and Division street.

Mr. Pepper.—I have vaporized resin by burning it in sand. In using camphene and benzole, and the refined oils between benzole and camphene, I have found them to burn very slowly, and, in the absence of the blast, to smoke; but if I added even a spoonful of alcohol, it seemed to saturate the whole mass, which would then burn very well, but I may say that I never succeeded in burning the crude oils without introducing air, which I found gave increased heat. I claim that there is no combustible body but can be burned without smoke if oxygen is supplied in the right proportion. I claim that there must be a mechanical division in order to make these heavy oils burn, and I have found that sand makes this division. There is no fluid that gives off smoke but I can burn without smoke if sand is used; with sand, burning fluid can be used as fuel.

The Chairman.—It seems to be implied that the addition of the air is to heat the sand; Mr. Parish, of Philadelphia, has introduced a plan, which is now in use at the St. Nicholas Hotel, in this city, in which a vapor is generated from petroleum, and this vapor is then combined in certain proportion with air; if this plan is successful, I cannot see how Mr. Pepper's sand is of any use.

Mr. Pepper.—When I burn ordinary gas, the sand through which it passes becomes red hot; this sand serves to burn the hydrogen, and the intense heat of the hydrogen burns the carbon, giving a very brilliant light; my patent claims getting a greater light by passing gas through sand. The burning of gas in a sand bath is not in my claim. I design to run an engine by petroleum oil, and that will be by burning the oil through the sand. I have tried kerosene, but I could not burn it without forcing air through the sand. The petroleum which I will use will be of the crudest kind, just as it comes from the well.

Mr. Dixon here made a drawing of a Russian alcohol blow-lamp, which is used for melting brass and other metals, also for brazing large pieces of metal. The following is a section of the lamp:



Alcohol is put into this lamp up to the dotted lines and also into the hollow drum marked A A, through the plug C; on lighting the alcohol in the cylinder, the flame heats the drum A A, and forces the alcohol out through the blast-pipe B, which gives an intense heat sufficient to melt a pound of brass. Mr. Dixon said he intended to use petroleum instead of alcohol, which would make this lamp very valuable for brazing.

The subject of "Petroleum" was continued for the next meeting.

Adjourned. JOHN W. CHAMBERS, *Secretary pro tem.*

AMERICAN INSTITUTE POLYTECHNIC ASSOCIATION, *April* 9, 1863.

The Chairman, S. D. TILLMAN, Esq., presiding.

Mr. Henry Withall exhibited his moving planisphere, showing the position of the heavens at any given time, by which the name and location of

any star visible to the eye can be found as readily as the name and residence of a person in the directory. This is done by moving the index to the proper place as regards the time of night and date of the month, and if the sky is clear the name of every star visible can be told, and its time of rising and setting, the rising and setting of the sun, &c. Mr. Withall explained its use in a very comprehensive manner.

The Chairman.—Mr. Withall's planisphere, which he has just described, has been shown to several scientific gentlemen, among them Prof. Pierce, of Cambridge, who has approved of it; it is now in use in many of the colleges, and is now adopted in many common schools.

Mr. Grieves showed several specimens of petroleum from different wells, and described their qualities. He said that it had been asserted that turpentine was found in petroleum, but in all his experiments he could not find it. He was inclined to believe that the oils could be purified, and that chlorine gas, which acts on the lower series, will be found best adapted for this purpose.

Owing to sickness, I have been unable to make the necessary arrangements to show you some of the various products of the distillation of petroleum. And could I have done so, it could only have been done in a very imperfect manner, as the time would not have admitted of more than one product being eliminated, had I brought the crude petroleum ready treated for distillation. Had that not been done we would not have been able to get the first distillate. I would have been very happy indeed to have prepared a few materials and shown some of their products had my health permitted me to do so.

I will first call your attention to two series of hydrurets or homologues of two well known gases. The first is the "marsh" or light carburetted hydrogen; the other is the "olefiant" or heavy carburetted hydrogen. Many of you are doubtless aware that every organic compound belongs to some organic series in which each individual member of the elementary substances is increased or diminished by certain regular and fixed quantities. Petroleum, the subject matter of the evening, belongs to the second series just alluded to, but not being a hydrocarbon oil *proper*, but a series of oils belonging to the same family—the members of which are distinct one from the other—they having the same root, but differing in the branches. Each member of all the different groups containing a different number of the equivalents of C. and H., forming chains which rise step by step from the solid to the liquid, and from a dense liquid to a light and extremely volatile liquid, and finally to a permanent gas. When the components of C. and H. are the same in any of the different groups, their properties will be the same, irrespective of their origin. They will give the same amount of light when burned in the same lamp. This likeness they may possess can only be discovered by their boiling points, their specific gravities, or what is better still, their ultimate analyses. The species of hydrocarbons includes oil gas, coal gas, olefiant gas, oil of lemons, otto of roses, oil of turpentine, petroleum, naphtha, naphthaline, caoutchoucine, and several others.

Several of these, by distillation, yield hydrocarbons, isomeric, with some of the series we get from distilling petroleum. In fact some of them

are identical in atomical construction, and possessing the same physical properties. Common petroleum of a low specific gravity usually contains a portion of marsh gas, olein, stearine and resin, with a brown substance, in solution. It differs greatly in color and consistency; some are dark and viscid, others are transparent, very fluid and volatile, others are dark brown, thick, unctious looking fluids, resembling Orleans molases, and possessed of high lubricating qualities. More generally it has an oily consistence, a brown or greenish color, and a strong penetrating characteristic odor. It may be regarded as a compound of several of a large group of bituminous substances, which differ much in physical character, while they present a striking similarity in chemical composition. The more limpid varieties mix with alcohol, ether and all the oils, both essential and unctious. They dissolve iodine, phosphorus, sulphur, most of the resins, wax, spermaceti, and soften caoutchouc, forming a gelatinous varnish with it. These are the leading physical characteristics of petroleum in its crude state. If we examine the crude coal oils, we find but a few of its characteristics in them, but that few are peculiar to them all. In refining petroleum, we find that it differs from coal oils, in requiring a greater heat for their distillation; and what is most singular in the matter is, that the boiling point of petroleum is generally considerably lower than coal oils, the petroleums boiling at 160° to 201° and upwards, (some even lower,) but the lowest boiling point I have found in coal oils has been 216° Fah. As I remarked the other evening, petroleum yields a variety of oils of different specific gravity, according to the temperatures to which it may be subjected during distillation.

This is a point of the most vital importance to the manufacturer, as an increase of the degree of heat employed will change the properties of his products, by increasing the proportions of the carbons, so much so as to render it worthless for the purpose of illumination; while a temperature too low would give results equally disappointing. Each of the oils composing the aggregate collection has a different number of the equivalents of C. and H., with which the boiling points doubtless agree, but the exact rate at which the boiling point does increase according to the proportions of C. and H., present in the several oils, has not yet been determined, although experiment has demonstrated that there does exist more than one or two series of boiling points. In the fatty acids, alcohols, and other bodies containing oxygen, the boiling points are uniformly about 34° Fah. for every H_2 C_2. But the hydrocarbon series seems to vary much in their boiling points. I have found the boiling points of some of the more volatile productions to be only 18° apart, while others less volatile were 25°; some were 34°, and above this point they are so irregular that I presume there must be a number of series yet unexamined, as some of them range from 20° to 40° and upwards above the last regular point 34°. It is a well known fact that the greater the quantity of C. in proportion to the H. any of these oils contains the greater is its specific gravity, the higher its boiling point, density of vapor, and tendency to smoke when employed for illuminating purposes. And that some of these oils, a much larger proportion than others there cannot be any doubt. A short time ago I had occasion to make some inquiry in regard to an oil that was weighed to go to a port

in France. It was a No. 1 oil of a well known brand, sold as one lot, perfectly transparent, deodorized about alike, and yet it varied from 3 to 44 pounds to the barrel, making a difference of over one pound to the gallon. Some of the solid products have been examined also, and in some of their physical properties they vary almost as much as the more numerous liquids. I now allude to paraffine. Fillipizzi examined one sample and divided it into nine distinct portions, with fusing points varying 113° to 139° Fah. Varieties examined by others varied from 92° to 149° Fah. In over 40 samples I have examined, I have found their fusing points from 108° to 130° Fah. I would remark in this connection, that some varieties of it contain scarcely a particle of paraffine, while others will yield about four pounds to the gallon. Naphtha seems to be the dividing medium between two distinct series of hydrocarbons. They are distinguished by the indifference of one to No. 5, while the other is powerfully acted upon by its producing a variety of products that act as a base for other chemicals to act upon. Their difference may be expressed by $+ n$ H—H for the lower series. There is one thing worthy of notice that may not be generally known in regard to these light carbo hydrites: that the action of No. 5, upon all light, distilled H. C., whether from coal, wood or petroleum, forms compounds having an aromatic odor; some like cinnamon, others like oil of bitter almonds, others cedar wood, and so on.

Dr. Parmelee.—What is the weight of a gallon of this oil?

Mr. Grieves.—The weight of a gallon of the lightest is a fraction over seven pounds, and the heaviest about eight pounds. The oil that I obtained four pounds of paraffine out of a gallon, was of the same quality as that from coal oil.

Mr. H. J. Callo.—Have you ever froze the oils, and after that put them in under the air pump?

Mr. Grieves.—I have froze them, but never subjected them to the air pump. I have treated them with phosphorus, and the odor was worse than the original—a single drop on this table would scent the room; but the vapor of this oil when lighted would throw the gas of this room in the shade; when burned with a wick it gave a pale bluish flame. I have also tried to distill the oil and treat it with lead, when it exploded and threw the oil in all directions. There is sulphur in some of the oils, but I have not found any phosphorus in it.

Dr. Colburn.—If it was sulphuretted hydrogen that gave the oil its odor, would not chlorine remove it?

Prof. Everett.—The chlorine would give a greater odor than the oil itself. The remedy would be as bad as the disease.

Mr. Grieves.—Camphor gives its own peculiar odor to the oil, thus neutralizing the smell of the oil.

Dr. Stevens.—Have you ever tried the essential oils?

Mr. Grieves.—I have never tried them, as they would be too expensive.

Prof. Everett.—Have you ever found alcohol to combine with the oil? I never have.

Mr. Grieves.—Only with the lighter products.

The Chairman.—This is the third evening that we have had this subject under discussion, and so vast is it that we seem to have have hardly

entered into it. Petroleum, or rock oil, is becoming an article of great commercial value, and is assuming a world-wide importance. The geological part of this subject has been fully and ably treated by Dr. Stevens, while Prof. Everett has given us its chemical relations, and the different processes for refining the oil, and Mr. Pratt, and others, described the mechanical appliances for obtaining it. The oil is now largely exported, and I may say Europe is depending on us for its supply. It gives rise to millions of profit, and marks an era in the history of our country. It is a subject of which very little is known to European chemists, and every fact connected with it is of great importance, and to get all the light possible on this subject we have continued it for several evenings.

Mr. Page.—I have found that the Canada oil, which was brought to this market some two years ago, had a great quantity of sulphur in it, and we did not know what to do with it; the smell was so intolerable we were complained of, and in some cases we had to throw it away. It was stored at Williamsburgh, and the ferry master at James' slip, in this city, said he could smell it there.

The Canada oil is, perhaps, the most full of sulphur of any in the world. The odor can be smelled for over half a mile, but it can be taken out entirely. I have seen some that the least odor could not be detected in it, and this same before being purified, if in a bottle in this room, and the cork taken out, no one could remain in it.

The Chairman.—Can you tell how this odor was removed, as that would be the most important part of the subject?

Mr. Page.—The gentleman who did this is in this city, and he promised to be present and explain it this evening. I do not feel at liberty to describe it myself.

Mr. Grieves.—Coal oil has always the same odor; but no two specimens of petroleum from different wells, even when very near each other, have been found to be alike in odor.

Mr. Page.—Canada oil is the best burning oil that can be found. Its density is about 45. It will give a light equal to coal oil, and more resembles coal oil than any other I am acquainted with. It creeps up the wick and burns very beautifully, similar to sperm oil.

Prof. Everett.—It is pretty well settled now that the best way to treat the oil is to use sulphuric acid and soda. This mode is generally adopted. As camphor contains a large amount of oxygen, it may be for that reason it appears to be a good deodorizer. Canada oils are more uniform, and, therefore, in distillation, give always near the same result. The difficulty with all other oil is the varying qualities of each well, no two being alike either in distillation or odor.

Dr. Stevens.—In the United States there are some forty-four different beds of coal, but there are no two of these beds precisely similar; and if we take the same kinds of coal, but found in isolated basins, sometimes one hundred miles apart, we will find the difference so great that engineers, firemen, and others accustomed to burn coal, can tell where the coal comes from by its peculiar burning. One kind of coal will not make a gas of good quality, while another will. One is sure to burn up the iron of the grate, and the other melt in the fire and become a mas of cinder; and

when we come to distil the coal, they will each make an oil of various chemical proportions, and what is very singular, coal that has a quantity of hydrogen in it, cannot be found in distillation. So, when we come to petroleum, it is the same, each differing from the other. The oil from the Ohio river differs from that of the Kiskiminitas, and these will be entirely different from the petroleum found in California. We know that beech wood makes a different product than that from seaweed, and that resin is different from beech wood; and then coming down to particulars, so that a chemical botanist could readily tell the different products from the different kinds of wood, so let us come down to the theory that petroleum is a vegetable production, and that Canada, at the time the resins were formed, had no large forests; we must look for petroleum in some other direction, so we look to the sea, and find a large part of the animals constituting a proportion sufficient to furnish raw material for this purpose. As we go up in the geological series containing petroleum, we find that the land plants increase; and as we come upward we find the resinous trees just beginning to grow upon the American continent, and also other trees very similar to the palm and cocoa growing here, and we can suppose that the strata which contains petroleum consisted of ferns, and, in addition to them, fish and coral, shell fish, and at once can see how every one of the oils in the United States will have some peculiar qualities, and will form a sufficient difference that no two products of distillation will be precisely alike.

Dr. G. F. J. Colburn.—Would not the oils partake somewhat of the properties of the minerals through which they passed?

Dr. Stevens.—Undoubtedly they would; the sulphate of iron is found very largely in petroleum.

Dr. Colburn, of Newark, presented a chimney for oil lamps, the upper half of which was made of metal to obviate the cracking of the chimneys so common in the glass ones; the upper part is hinged, which, on burning the lamp, can be lighted without removing the lower part, which is of glass; the upper part is connected by a rod to the lower end, that rests on the lamp, to conduct the heat from the upper metal, and thus equalize the temperature. The chimneys can be made for 13 to 16 cents, glass and all.

Mr. Page exhibited several lamps burning petroleum, which showed the combustion produced by each; some of the lamps burned well without chimneys; they all burned the same quality of oil. Mr. Page said: There was not much progress made in chimneys until about the seventeenth century, when a German made some experiments and published an account of them. We have no particulars of the English doing anything in this way, but the Germans and French have. In order to make an oil like petroleum burn well, the theory in regard to combustion should be thoroughly understood and mathematically correct, such as two and two make four. There is always cause and effect, and the want of this indispensable requisite is the cause of hundreds failing who have spent their hours over the midnight lamp.

Mr. J. E. Ambrose, of Jersey City, exhibited his hand lamp, to burn with or without a chimney; it can be burned very low without giving any odor.

Mr. Ambrose also presented his car lamp, which was burned without an inside chimney, the large globe usually used on these lamps being the only one used; he said they were in use on the Second and Third avenue cars, in this city, and in Brooklyn.

The Chairman.—It is no doubt known that, in the French mechanical or Carcel lamp, the oil is carried up to the wick by machinery, and this lamp was very extensively used in England, particularly in the houses of the nobility, but one great objection to it was, that when it got out of order it had to be sent to France to be repaired.

Mr. George A. Jones exhibited his mechanical lamp; he said the principle on which this lamp is made, was to reverse the usual order of things, and place the chimney at the bottom instead of at the top. It is the result of the ingenuity of a French gentleman, Mr. Keravenan, who was confined to his room, in this city, with the gout, and having plenty of leisure, was told by a friend that if he could invent a lamp that would properly burn kerosene oil, his fortune would be made; so he set to work, and we have here the result. He reasoned that it could be done in two ways, and one was to have an immense chimney, on the principle of those used in large factories, where they have some 100 feet high, and the other was to put a blower in the lamps similar to those used on steamboats and stationary engines; each would answer the same purpose, so he choose the blower as being the most convenient, and with the carcel lamp for a basis, he fitted a blower at the bottom which was turned by machinery, and this blower supplied the oil with sufficient air to burn with the brightness which is now seen, and a thorough combustion of the oil effected, neither was there any perceptible odor.

Mr. Bull.—What kind of oil do you use in this lamp?

Mr. Jones.—I got it at the first grocery store I found in Amity street on my way up here. I asked for kerosene. Mr. Keravenan has since gone to France, and when he left, this lamp would only burn three hours; we have since made improvements upon it, and it will now run for six hours, and if it gets out of repair we will not have to send to France to fix it; if it is desired not to burn the whole time, it can be turned down very low and still burn and not give any odor. The whole of these lamps (with the exception of the spring), tools and everything, are made in my shop. The steel used in this spring for keeping the fuse in motion, I have to send to France for. I have experimented very largely with steel for this purpose and I cannot find any to possess the uniformity of the French steel spring. The machinery in this lamp is the same used by Jaques, who made the Carcel lamp. This lamp has an inch wick, and the flame is double that of the wick; in this respect, this lamp differs from others. The machinery drives the blower at the rate of 2,500 revolutions a minute, which we have found is sufficient to supply air for a thorough combustion of the oil. The movements for this purpose and the shape of the lamp are patented. The cost of the lamp will be about twelve dollars.

The Chairman.—Prof. Draper, of the New York University, who has made some interesting experiments with light, says that the light produced from kerosene oil is superior to all others, and he turns off the gas and uses a lamp in preference to it, as it gives a better and steadier light.

Mr. Jones.—What has bothered inventors in lamps very much is how to

make an endless screw that would make 2,500 revolutions in a minute and not wear out. Some ingenious Yankee has taken clock movements and done very well, but it would run down in a few hours and the works soon wear out. The pinions in my lamp are made of the hardest steel and polished. I have never found the least odor about this lamp except a little before lighting it. The blower is worked by an endless lever, the same as in a musical box, made of polished steel. The spring is made to uncoil uniformly, for a spring that will not unwind evenly will cause the blower to go slower and cause the light to flicker. In this respect we are very particular. The spring is heated in a furnace and tempered in oil, it is then repolished, when it is blued, and after that polished again, when it is coiled up and unwound and watched closely in uncoiling to see if it unwinds uniformly.

Mr. Fisher.—Why would not a weight intead of a spring answer?

Mr. Jones.—With a stationary lamp this would do, but would not answer otherwise. The spring in this lamp will raise eight pounds.

Mr. Rowell.—It might be made to have the lamp fixed, and the machinery to supply it with air placed outside, and let in the air as it is wanted; it would then only require a simple meter, such as is used in measuring gas, to know the exact supply of air necessary for a perfect combustion for a given quantity of oil.

"Street and Suburban Locomotives" was adopted for discussion at the next meeting.

Adjourned. John W. Chambers, *Secretary pro tem.*

American Institute Polytechnic Association,
April 16, 1863.

The Chairman, S. D. Tillman, Esq., presiding.

Mr. Chambers, secretary pro tem, read a circular signed Horatio Allen and B. F. Isherwood, commissioners, appointed by the secretary of the navy to devise and conduct a set of experiments to ascertain, by means of practical results, the relative economy of using steam with different measures of expansion, and desiring to have the benefit of the judgment and suggestions of those conversant with the subject.

Dr. Rowell moved that the subject be referred to a committee of three, which was carried, and Messrs. Fisher, Dibben and Rowell were appointed.

On motion of Mr. Adriance, Mr. S. D. Tillman was added to the committee

Dr. Rowell.—As an item of interest during the miscellaneous business, I may mention that the use of wood for making paper, has been very largely experimented upon lately. Mr. Lyman's new method is to grind up the wood while in a vessel heated to some 350 to 400 degrees, and after being thus treated for some time, a quantity is allowed to flow out, which is then rubbed fine, so that the silica can be washed out; the trouble and expense of using an alkali are done away with. This plan has been found to work very successfully.

The Chairman.—The difficulty in making paper out of wood, is that the alkali does not remove all the silica. The experiments which I have seen of Mr. Lyman's plan, was to grind the wood under pressure, and this pressure was continued until the operation was complete.

Mr. Page.—I would like to inquire if the subject of ghosts would be a proper question to be discussed here. It is a subject that is creating considerable excitement at present. I see it has been taken up by some scientific societies in London, illustrated by optical experiments. My object in mentioning this subject is, that we may throw some light on a matter that is very little understood by the majority of the people. I am satisfied that a scientific discussion of this question, such as I know it would have here, would do much good. I have lived in a community where men could not be prevailed upon to plant potatoes, or other kinds of produce, when the moon was going down. We all know with what dread some people pass a grave yard, or lonesome place, at night. Now, if by a scientific discussion, we could succeed in removing some of these superstitious ideas, I think we would be benefiting mankind.

Dr. Parmelee.—This inward dread, superstition, or whatever else we may call it, is inseparable from our nature; we might as well try to do away with the instinct of the young duck, which, immediately after the egg is hatched, strikes a bee line for the nearest pond. It is implanted within us, and controlled by judgment resulting from education, but still it sometimes gets the better of us.

The Chairman announced the subject for discussion, "Street and Suburban Locomotion," and said:

It was undoubtedly the intention of the gentleman who proposed this question that we should confine the discussion to locomotives. The full meaning of street and suburban locomotion would seem to fairly embrace, First. The power used in locomotion. Second. The size and form of vehicles used. Third. The quality of the roadway ; and Fourth. The direction of the great lines of travel. I therefore propose to say a few words on the last two heads, leaving the questions of locomotion, and form of vehicles, for the general discussion. The last division of the question is an extremely interesting one to the city of New York, just at this time, when it is proposed to grant a charter for a railroad in Broadway. The ostensible object is the relief of that magnificent avenue, and the first query which presents itself is, whether increasing the facilities for travel in Broadway, by means of railways, will increase or diminish the number of persons passing through it daily ?

The narrowness of Manhattan Island, compared with its length, and the position of the financial center, the city hall, the courts, the Merchants' exchange, near its southern end, will account for the great pressure in cars and stages, during the business hours. Many thousands reach their places of business by the Staten Island, Brooklyn, Jersey City, and Hoboken ferries. Still a greater number reside above Union Square. For them Broadway is the most direct route, and should they all take it, the street would be entirely monopolized by a class of persons who never lived nor did business in it, to the exclusion of the occupants of Broadway property and those who desired to trade with them. This evil, arising from the

blocking up of Broadway by persons having no business in it, was first somewhat alleviated by the establishment of the street railway running in a nearly parallel direction; the success of this railway was such as to warrant the establishment of the several lines having their termini near the city hall.

There are now three lines of cars on streets adjacent to and on either side of Broadway, which are constantly bearing away crowds who would, if compelled to walk, naturally keep on this central avenue.

Another plan for the relief of Broadway, is to make the pavements of the adjacent parallel streets so excellent as to entice into them the travel of carts and loaded vehicles. Should this measure be adopted there would doubtless still be too great a pressure in the main thoroughfare; yet, with this great evil to be averted, there are those who believe a railroad should be constructed in Broadway. The effect of such a measure would be to vastly increase the travel in that street. What the result will be is not difficult to conjecture.

The remaining question with regard to the roadway is one to which I have devoted much study. The problem is to construct a roadway which shall be unaffected by frosts, perfectly smooth to all ordinary wheels, and at the same time rough enough to afford a foothold for the horse. I have constructed cast iron blocks, which are held together by tongues, so that they cannot move longitudinally, laterally, or vertically, after they have been fitted together. Their surfaces are so indented that both the provisions of smoothness to the wheel and roughness to the horse shoe, are completely fulfilled. The only objection to this road at the present time is the increased cost of iron; but even now the road can be laid at a less cost than the Russ pavement. On this road a horse can draw more than upon a railroad, because the great friction of the flange, which is vastly increased on curves, is entirely obviated. The number of concussions daily received by an omnibus upon the best Belgian pavement is about half a million. They also affect the horse and passengers. Both carriages and horses would last much longer if these evils were obviated. But the crowning benefit is the absence of noise.

Dr. D. D. Parmelee.—About ten years ago, in connection with a friend, I spent considerable time in devising various plans for a railroad in Broadway, and after considering the subject of using steam, as a motive power, we came to the conclusion that the use of steam, at that time, would not pay, so we directed our attention to compressed air; our plans appeared to be perfect; the cars were to be supplied with air at each end, by a large stationary engine; the pressure of the compressed air was to be regulated by a valve, and we felt confident we could run a car from 42d street to Canal with one supply of air. The air was to be compressed very much; and, as our boilers were to be made of steel, and as it is well known that cold steel will stand a greater pressure than when hot, we could, therefore, use a higher pressure of the air than if we used steam.

The Chairman.—The great difficulty in the way of using compressed air is, that the pressure is varying with every stroke of the engine, so that if the pressure should be only five pounds short, the engine would stop.

Mr. Rowell.—In 1845 a plan on this principle was tried in Ireland, on

the railroad leading from Dublin to Dundalk, and this system was at one time so popular, that it was proposed to unite England and France by means of compressed air; but it was found that the variation of the temperature with every stroke of the engine, was so great, as to vary the speed very perceptibly. There was also an atmospheric railroad built in England, which consisted of a tube some three feet in diameter, running the whole length of the road, and laying between the rails; this tube had a slot or opening on the upper part, through which came a projection from the piston, which was fitted to this tube. The cars being attached to this piston, the air is exhausted from one end, which causes a vacuum, the air behind the piston pushes it forward with great velocity; but, owing to a variety of difficulties, this method, I believe, is now entirely abandoned.

The Chairman.—This atmospheric railroad differs from the ordinary roads only in its motive power; they had all the other appliances of other railroads, such as double track, cars, &c. Now, when we consider the cost of laying this center tube, and keeping it in repair, it will be found that the usual mode of taking the power along, and using it as it is wanted, is much superior.

Dr. Parmelee.—I believe that the time is not far distant, when coal will be dispensed with for generating steam, and that petroleum will take its place. In Pennsylvania, at the oil wells, they use the oil to generate the steam in their boilers, and they find that 500 pounds of petroleum will do as much, in the way of fuel, as 2,000 pounds of coal, thus doing away with 1,500 pounds of coal, which, on cars or steamboats, is of great importance. But the introduction of anything new is always attended with great difficulty; we all know the prejudice there was to the use of the steam fire engine, the obstacles in way of their introduction seemed almost insurmountable, and we all know how valuable they are at present.

Mr. Godwin read the following statistics of the exports of petroleum from the United States, in first quarter of the year:

1861	60,021	galls.
1862	1,816,262	do
1863	9,040,604	do

Exports from Boston, first quarter 1863	933,410	galls.
Exports from Philadelphia, first quarter 1863	1,442,642	do
Exports from New York, first quarter 1863	6,546,731	do

Export from New York to foreign ports, from Jan. 1, 1863, *to April* 6, 1863.

	Past 3 days. Galls.	Previously. Galls.
To Liverpool	......	1,192,492
London	......	1,020,963
Glasgow	......	123,298
Bristol	......	375
Falmouth, E	......	323,449
Grangemouth, E	......	211,054
Cork, etc	......	409,696
Havre	......	420,034
Marseilles	......	287,273
Bordeaux	......	......
Cette	......	......
Dieppe	......	46,000
Antwerp	......	732,757
Bremen	......	404,869
Hamburg	......	504,642
Rotterdam	......	250,300

	Past 3 days. Galls.	Previously. Galls.
Malaga	......	38
Gibraltar	......	175,161
Oporto	......	200
Genoa and Leghorn	......	53,286
Lisbon	......	1,190
China and East Indies	......	2,450
Africa	......	100
Canary Islands	......	......
Australia	......	132,911
Sydney, N. S. W	......	24,686
Brazil	......	53,578
Mexico	200	16,850
Cuba	9,432	188,782
Argentine Republic	......	12,950
Cisplatine Republic	......	62,036
Chili	......	13,200
Peru	104,360	82,480
British Honduras	......	440
British Guiana	416	8,520
British West Indies	236	15,587
British North American Colonies	......	1,304
Danish West Indies	1,961	4,716
Dutch West Indies	......	3,754
French West Indies	......	3,810
Central America	......	......
Hayti	1,600	2,654
Venezuela	2,102	5,927
New Grenada	350	62,641
Porto Rico	......	17,408
Total gallons	120,657	6,873,861
		120,657
Total for 1863		6,994,518

In addition to the above, there has been exported to foreign ports, since 1st January, from Boston, 939,891 gallons; from Philadelphia, 1,377,039 gallons; from Baltimore, 364,806 gallons; and from Portland, 155,463 gallons—total 2,837,199 gallons—making a total export from the United States, since 1st January, of 9,831,717 gallons.

Mr. Page.—I believe that the supply of petroleum is like the supply of coal, almost inexhaustible. Canada is full of it, Oregon, Ohio, and California, West Indies, Ceylon. There are, no doubt, millions of gallons lying in the earth, like the gold in California. When the oil was first discovered it had to be pumped up, but nature then came to the assistance of man, and forced it up. Last year petroleum was sold for nine cents a gallon ; it is now sixteen. We have lately sent from 3,000 to 4,000 barrels a day to Germany, and it is going to the very place where they have it under their feet. Japan is full of it, and I have been told that they burn it in the streets of Japan by placing the oil in wooden tubes, and then lighting it. The uses to which it can be applied are very numerous, and I should like to see it employed as fuel in steam boilers.

Dr. Rich.—Several years ago I was present when a plan was brought before the American Institute for a railroad in Broadway, to be under the street. The idea was to build a vault under the roadway; the advantages claimed for it were, that it would be out of the way of vehicles, and warm in winter and cool in summer, easy of access at all times, and very dry; it was to be lighted throughout with gas; the speed could also be increased to twice that above ground, and fires would not interfere with their running. The plan appeared to be perfect in every detail.

The Chairman.—I see they have in operation in England, a Yankee invention, called a pneumatic railway, about a mile in length. It is an air gun arranged to carry packages, by discharging them through a pneumatic tube. It is said that the length of this tube, one mile, can be traversed in one minute. Traveling with the wind, neither faster nor slower, nothing is felt of its influence except just a very little when going head foremost, from the air which finds its way in at the end of the tube. The space is too small for reverberation, and there is less noise than would be expected from iron rattling on iron.

"Harbor Defences, and the Use of Iron-clad Vessels," was selected as the subject for discussion for the next meeting.

Adjourned. JOHN W. CHAMBERS, *Secretary pro tem.*

AMERICAN INSTITUTE POLYTECHNIC ASSOCIATION, *April* 23, 1863.

The Chairman, S. D. TILLMAN, Esq., presiding.

IMPROVED ROADS.

Mr. J. K. Fisher.—During a residence in Naples, some years ago, I speculated on the subject of lava, as a material for roads. It was used to pave the streets of Pompeii, and is still used in Naples—and seems sufficiently hard for the purpose—much harder than many stones used for paving and road making. And it may be molded into blocks while it is in a semi-fluid state, as it flows for miles, and its surface may be roughened according as the mold is made. A railway might be laid to transport the blocks to the shore, or even to Naples; and vessels may transport them to cities where they are wanted.

After my return, I went with several members of the Institute to see the operation of making plate glass, at Williamsburgh. It struck me that the glass was nearly of the consistency of lava as it flows from Vesuvius, and that, could we make artificial lava, we might roll it into plates as they roll glass; and we might make them thick enough to pave with.

It also occurred to me that a road might in this way be surfaced with cast iron. To do it would require a furnace moving on wheels, at a steady and slow rate; such a rate as would bring the roller into contact with the melted metal upon the road just in time to give it the requred shape and a sufficient chill. And if a great extent of road were to be covered with a continuous sheet of iron, several furnaces might be required, so arranged upon the moving platform as to relieve each other, and to produce a regular flow of metal.

In laying either iron or lava in this way, it appears to me, it is practicable to give any desired roughness to the surface, any figure or pattern that may be best for the foothold of horses. And this roughness may be spread over the whole surface, as in the iron pavement invented by Mr. Tillman, or it may be confined to the horse tracks, leaving the wheel tracks smooth.

In publishing this idea of a traveling furnace to pour melted lava or iron upon the road, and a roller to surface and chill it, I wish it to be understood that I do not abandon my claim to a patent for whatever is original in it. I publish it for the purpose of obtaining aid to determine whether the design is worth pursuing; and, if worth pursuing, to invite the coöperation of engineers and capitalists, and others who may help to promote it. How much of it is new, and how much of it may have been known before, I cannot now say.

It may be objected to this plan, as it was objected to Barlow's continuous rail, that the expansion and contraction due to changes of temperature will work the iron or lava. But in the case of Barlow's rail, and others similar to it, it was found that the elasticity of wrought iron was sufficient to compensate for the effects of temperature; and that, practically, there was little or no difficulty from contraction and expansion, even in split rails, where, at points, only half the section of metal was available to resist the force of contraction. In case of a continuous sheet of cast iron, of even breadth and thickness, or equal cross section, there would be less liability to derangement; because, first, the whole length would stretch to the extent of its elasticity before rupture or permanent set would occur at any point; and, second, because the elasticity of cast iron is greater than that of wrought iron, in the proportion of seven to six. Compared with a line of continuous split rail, like that for a long time used on the New York Central railway, a continuous cast iron road surface would bear a charge of 140 degrees as well as the rails would bear a charge of 60 degrees, or it would bear a charge of 280 degrees as well as the rails would bear 120 degrees. But it is not absolutely required that the road be continuous; there may be slip joints at intervals, if there be much difficulty in making it solid. Even cracks, such as might occur in a road made without skill, would be trifling when compared with the defects of the best pavement we have at present.

If these ideas be correct, it is practicable to pass a movable foundry through a street, upon a temporary railway, leaving behind it a floor of cast iron, either smooth, or indented to prevent slipping, and shaped to secure drainage. I think the whole surface, from house to house, should be made at one operation, and the ups and downs at crossings should be avoided, as they are in Naples, Florence, and other cities that are paved with stones like those of our new sidewalks in Broadway. And access to sewers and pipes should be from the sides, and not down from the surface, as was proposed by the London engineers twenty years ago.

The cost of cast iron paving on this plan would, I believe, be much less than that of cast iron laid in pieces. There would be no displacement, and repairs would not be required, except in cases of breakage, which ought never to occur. And we have had practical proof, from Scotland, that cast iron paving remains apparently uninjured after good stone paving, subject to the same traffic, has become unfit for use; and that the annual cost of the iron is less than half that of the stone. Could we sum up the cost of relaying, incumbering the streets, repairing, cleaning, the waste of motive power, damage to carriages and their loads, wear of shoes,

and injury from dirt, I believe we should find that the common pavement costs ten times more than the best iron pavement.

But if the best and most agreeable paving were to cost double or treble; if, instead of $1,200,000 per year, which we have in some years paid for paving and cleaning, we were to pay three millions, and be free from dirt, I think the citizens would choose the decent system, and no more desire to resume the indecent one, than they desire to be relieved from the Croton water and the cost of it, or the sewers and their cost.

But if the citizens generally, of all conditions, did wish to endure the present nuisances, rather than pay the taxes necessary to maintain a system accordant with taste and science, it would be the more incumbent on a liberal scientific association to show the desirableness of the better system. It may be the policy of politicians to tell the public only what the public already knows, or is prepared to believe; but men of science, who belong to the liberal professions, must not seek popularity by such means. This I say for the admonition of those who are disinclined to agitate improvements that are not likely to come into use within a short time.

Not only in streets, but in suburban thoroughfares, and in all roads of great traffic, would this means of surfacing be applicable. Cast iron would be profitable where the traffic exceeds a certain amount, easily found by calculation. On roads of less traffic, but still considerable, lava would be profitable, as I think. But I do not know the cost of making it; the heat required; the distance from which the materials would have to be brought; these are points upon which I ask for information.

After which the regular subject for the evening, "Harbor Defences, and the Use of Iron-clad Vessels," was taken up, when the Chairman said:

It will be remembered that we had this subject once before under discussion last winter, but since then some new experiments have been made at the South, and the civilized world is anxiously waiting the result of the recent trial at Charleston. As this is the third practical test of iron clad vessels, and some important facts in naval warfare have been determined, the subject has been again selected for discussion.

Mr. Dibben.—The accounts of the late trial at Charleston are so very meager, and so little that is definite known, that we cannot enlarge very much on our previous discussion, and all that I can say I fear will be but a repetition of what has been said before. There is this difference, however, in the late fight, that it was not iron-clads against iron-clads, but forts against iron-clads, and the iron-clads stood it well; from what we have heard, these iron-clads have stood all the battering the forts were capable of giving, without incurring any serious damage. Whether they tried to remove the obstructions in Charleston harbor does not appear; but from what we know we can conclude that the barring up of the entrance to this city at the Narrows, will stop all the iron-clads in the world. We have penetrated seven and eight inches of iron through and through, at a little less distance than this battle was fought. The English and French iron-clads have plates of from four to five inches thick; every shot from our rifle guns would go through these plates, at 400 and 500 yards. I do not think that all the iron-clads in the world would undertake to do what these seven monitors did, to expose them to a fire of 300 heavy guns for over

half an hour. The Ironsides not having the same thickness of plates as the monitors could not stand this battering. The monitors that were injured were made so by indentures made between the deck and the turrets, which prevented them from revolving; this was presumed to be one of the weaknesses of the monitors; but not a single Ericsson monitor was otherwise disabled in that fight, nor was there a gun disabled. I do not think a ship can be built to stand the fire of a 150 pound shot at an initial velocity of 1,400 or 1,500 feet in a second. We did not do serious injury to Fort Sumter, as might be supposed, as our shots had only some 800 or 900 feet velocity in a second. This speed will not do much damage to well constructed forts. None of the firing at Fort Sumter was capable of making a breach large enough to make two ports into one. Had this been done, there would have been some hope of continuing the attack; but the firing from our guns done no more than dent the walls some five feet. We have seen how much more effective is the rifle projectile than the round shot, which is due to its velocity, and indeed the whole question is one of velocity alone; this is shown in firing a soft metal through a hard one, such as a leaden ball through a copper cent; if the velocity is great enough, with a good gun loaded with nine or ten drachms of powder, and by throwing the cent in the air and when it is coming down by firing at it, the leaden ball will make a clean hole through it. Now, the secret of this is the speed at which the shot is fired; you can shoot at the cent all day with five drachms of powder without punching it. So it is with the large guns; the long rifle shot being two and three times the length of the diameter has a decided advantage in long range over the round shot, as one of three times the length of the diameter will have double the velocity of one of an equal diameter. The round shot is very effective for about two or three hundred yards, but beyond that the velocity decreases. A great many people have been disappointed in the late attack on Charleston; the obstructions seem to have been formidable enough to hinder our vessels entering the harbor. We have in it, however, an illustration of the perfect success of placing obstructions in the entrance to harbors, and one which, if we fully avail ourselves of, would compel an enemy to reduce Long Island before they could come up to this city, as it would be impossible for them to get to New York if they had to wait to remove these obstructions while the fire of our forts would be upon them. It was these obstructions only that prevented our monitors from entering Charleston. These seven monitors, carrying only fourteen guns, were exposed to a heavy fire at a distance of three to four hundred yards, and none of the hulls are known thus far to be penetrated or a single ball to go through the turrets, nor a man on board to have lost his life. These are very important points to reflect upon; a contest of 300 guns against 14 is indeed very remarkable, and that these seven monitors, with 14 guns, were able to stand the concentrated fire of 300 guns without any serious damage, is a most important event in naval warfare.

Dr. Stevens.—Would not these obstructions in the Narrows destroy the harbor and commerce of New York, for some time before they could be removed?

Mr. Dibben.—We can completely obstruct the harbor of New York in

twenty-four hours, and these obstructions can be removed in less than two weeks; but in making these obstructions, there should be openings made at certain places, to which floating gates should be attached, that could be removed whenever it was necessary for vessels to pass in and out. But in addition to these obstructions for harbor defence, we should have rams capable of going twenty-five miles an hour, to go outside and engage the enemy there.

Mr. Bartlett.—The best form of shot, and that which will give the greatest penetration, has been fully experimented upon by Mr. Lyman. The best form he has found to be that which is called the cylindrico conoidal, or a piece cut off the front end of a cylindrical bolt; these balls have been found very effective in punching.

The Chairman.—In some late experiments, I see it stated that it does not make much difference as to the shape of the ball, as several different shaped shot appeared to have the same penetrating power.

Mr. Dibben.—The shape of the shot is not material; it depends entirely on the velocity for its punching effect; but the mere piercing of plates with a very small shot will not disable a ship very much. There are no guns in the service known to be better than the Parrott guns, and these, and the Whitworth gun, have done more than any other in the way of heavy penetration.

Mr. Bartlett.—It is well understood that deep penetration is the result of velocity; but Mr. Lyman's son told me that he tried several kinds of shot with the same charge of powder, and found the form I have mentioned to be the best.

Prof. Everett.—A hollow cylinder open at one end, on the principle of the apple peeler, has penetrated through four-inch iron plates at 150 feet distance.

Dr. Stevens.—While we are speakng of iron-clads, and comparing their efficiency on the southern waters, we should not forget that the Mississippi river was plowed by a gunboat clad with only an inch in thickness of iron, and one inch of India rubber, and I think that our present iron-clad vessels could hardly have endured as much. Pure India rubber was found to be too elastic, and they combined fibrous material with it. Commodore Porter said, when in this city, that when the Essex was struck with a shot, it sounded like a large drum. The Essex was only iron-clad in front, and took part in all the heavy work going on. She took part at Forts Henry and Donelson where she received a shot through her chimney; and when at Island No. 10, she had workmen put on board, who fitted her up as she went along, and repaired damages after an engagement. She destroyed the Arkansas, which was clad with the T rail, and she made these rails fly very fast. The question is why other vessels like her were not built; this question has not, to my knowledge, ever been answered. But I know that when the rebels drove piles in the sand, to obstruct the progress of Gen. Prentiss in North Carolina, and when a council was held, the General said to the engineer, in the presence of the negro pilot that "the Almighty himself could not remove those obstructions." The engineer and negro pilot went that evening and took soundings, and the next night they entirely removed those obstructions, and the negro said that the

engineer was greater than the Almighty and the General together. But that exploit finished the services of that engineer with Uncle Sam; he could not get any further employment in the service after that. Uncle Sam is always very considerate; he never undertakes any enterprise, without giving his enemy due notice, and he seems unwilling to undertake any movements until the advantages at least seem to be balanced on both sides.

Mr. Meissner.—I have made experiments in Washington with India rubber, and have seen a ball go through thick plates and thin ones. There was no trouble in piercing the India rubber one inch thick; we tried the pure rubber, and had it mixed with cloth. I had twelve balls pass through my target.

Mr. Bartlett.—I would like to know if there is any engineer's report of the doings of the Essex, and at what angle she was fired at? I have not the least doubt but that the inch plates of iron, and India rubber, can be easily penetrated.

Mr. Dibben.—From the position of the works which the Essex had to operate against, I am of the opinion that any one of the monitors would have stood more than six vessels of the Essex pattern. There is no difficulty in firing a ball through an inch of iron at an angle of forty-five degrees; the angle makes very little difference, unless there is a low velocity. These exploits of the Essex were confined to very poor forts; but at Charleston they had everything prepared, and they had the best English guns, which were served with precision and vigor. These guns were obtained through the blockade runners; and some of the guns taken from vessels trying to run the blockade and sent to this city, on the ends being cut off to make breech loaders, showed them to be of a very fine quality, and the ends looked like silver.

Dr. Stevens.—All our gunboats are only an experiment, and the Essex was poorly adapted for one; she was nothing but a ferry boat run across the Mississippi, and built out west; she had to be put in fighting trim in a short time; she was under the batteries at Vicksburg for six hours; she destroyed several batteries below Vicksburg, and some of the shots received by the Essex were point blank. I think she has done more execution than all the others.

The Chairman.—It will be remembered that at Charleston our vessels had to stand the fire of five different forts at the same time, and at very short range. As to India rubber, it should be recollected that it is incompressible; that is, its atoms merely change their position by compression.

Dr. Parmelee.—I should like to ask Mr. Meissner if the India rubber closed up after the ball passed through it?

Mr. Meissner.—The shot made a large hole in the rubber, which immediately closed up again.

"The Manufacture of Sugar at the North," was selected as the subject for discussion at the next meeting.

Adjourned. JOHN W. CHAMBERS, *Secretary pro tem.*

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